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SUMMARY OF RECENT ABSTRACTS*

IX. LEPROSY

General

CHAUSSINAND (p. 362) has written a brief account of leprosy from antiquity to the present time.

A long account of the Fifth International Congress on leprosy, held at Havana in 1948, is reviewed on p. 509.

Epidemiology

Leprosy is present in Spain, where 1,510 patients were found in a recent survey (CORDERO SOROA, p. 859 ; LASTRA, p. 1093). There are now 7 leprosaria and many dispensaries, and 4 mobile units make a feature of examination of contacts.

There are over 200 people with leprosy in Cyprus, and MICHAELIDES (p. 365) states that the disease there is familial. Almost half of these patients are inmates of a farm or colony. The results of treatment of lepromatous disease with the sulphones are satisfactory.

In a survey of the Lake Province of Tanganyika, INNES (pp. 365, 366) found that the general incidence of leprosy was 15·8 per 1,000 [not per cent. as in the abstract], in a total of 61,607 examined. In some groups the rate was as high as 60 per 1,000. A survey of Lake islands indicated that the disease was relatively mild. As segregation is rarely practised there is much opportunity for contact between leprous parents and their children. Sample surveys made in many other parts of Tanganyika show variations in rate from nil to 35·7 per 1,000. In the Southern Highlands the average incidence is slightly lower than in most other parts, and as elsewhere in East Africa the disease is usually only moderate in intensity. A calculation indicates that in Tanganyika there are about 80,000 people suffering from leprosy.

A summary of knowledge of the distribution of leprosy in East Asia has been provided by GEHR and GEHR (p. 859).

An account of the origin and development of the leprosy settlement on the island of Makogai in Fiji is given by AUSTIN (p. 753), who shows that the disease in these islands is now under control. This is a satisfactory result of the organization created and the effort expended.

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1950, v. 47. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

In the island of Niue in the S. Pacific, leprosy was imported probably in the eighties of last century, but has apparently remained localized in two families, except for two other cases (DEMPSTER, p. 753).

MONTESTRUC *et al.* (p. 1094) discuss leprosy in Martinique, where family spread is notable and children form the largest group of new patients, and of lepromatous cases.

GONZÁLEZ PRENDES and YBARRA PÉREZ (p. 138) and GONZÁLEZ PRENDES (p. 545) give an account of the distribution of leprosy in Cuba, where the incidence reaches 6·05 per 10,000 in one area.

An account of leprosy in French Guiana is given in the report of the Pasteur Institute (p. 365). About one-third of the cases of leprosy are of lepromatous type (FLOCH, p. 1093). Infection has spread to the convicts in the penal settlement, who now show a higher incidence than the people outside.

In the Island of Pascua there are 51 persons with leprosy in a population of 720. CAMUS GUNDIÁN (p. 998) states that the people are mainly Polynesians of Maori descent.

An investigation in Batavia by BOENJAMIN (p. 363) shows that transmission by family-contact with a case of nerve leprosy is not proved, but that family contact with a case of skin leprosy is important, especially bed-contact. With bed-contact at ages under 14 years the average morbidity was 46·3 per cent., and at higher ages 6·0. In family-contact without bed-contact there was no significant difference in infection between the younger and the older persons. If there is bed-contact the duration of contact, including the incubation period, before the disease is established, is shorter than if there is contact in the family without bed-contact. Thus, bed-contact is the most important factor in family-contact. A very large proportion of leprosy patients, however, are infected outside their own families, chiefly by house-contact with infective persons. A similar paper was published by LAMPE and BOENJAMIN (p. 543).

In an important paper LARA (p. 544) summarizes 30 years of work at Culion. He emphasizes the great part played by contact of infants with leprous parents, especially those bacteriologically positive, but also those bacteriologically negative, in transmission of the disease. Exposure for one or two years in infancy yields as many cases as exposure for longer periods. The location of the earliest lesions is on parts of the body which are most in contact with parents, and infections appear to be due mainly to mothers carrying their infants. He states that a large proportion of lesions clear up without treatment. Separation of infants from leprous parents is therefore indicated, but has not been practicable at Culion. NOLASCO and LARA (p. 546) give details of some of the young children in whom primary leprous lesions had cleared up without treatment. There was evidently a high degree of individual resistance in these children, and most of them showed no sign of the disease although they continued to live with leprous parents for a number of years.

The leprosy situation in Mexico is discussed by NUÑEZ ANDRADE (p. 545), with special reference to children. The primary lesions were usually found on the face, upper arms, shoulders, gluteal regions and thighs, and consisted of papular nodules or small, slightly raised maculae. These lesions persisted, alternately increasing and decreasing, for long periods, and 10 per cent. presented relapses 1–3 years after apparent cure.

In Japan it is the custom to shave the heads of babies at the age of 100 days, and leprosy of the scalp is much more common there than in other countries. MANALANG (p. 546) argues that this supports the opinion that the ordinary mode of infection is through the skin, as a result of frequent and prolonged contact, usually in infancy.

Do PÁTEO (p. 999) stresses the importance of early diagnosis in leprosy, and records the results of periodical examinations of 72,000 contacts during a period of 5 years, which he takes as the average incubation period. In them, 796 developed leprosy, and most of these persons were under 5 years of age.

In a review of the subject of diet and susceptibility to leprosy, DHARMENDRA (p. 367) concludes that there is no experimental proof that malnutrition predisposes to leprosy, but there is considerable general evidence to that effect.

Aetiology

The Calcutta Leprosy Research Department (p. 364) have been unable to cultivate the leprosy bacillus in association with leishmania, as had been reported by ROW. Other work is recorded, including experiments which did not support the view that leprosy is spread by cockroaches. DHARMENDRA and MUKERJEE (p. 367) show that if leprosy bacilli are exposed to sunlight they tend to lose their acid-fastness. This effect is due to ultra-violet rays. The rat leprosy organism does not show this property, which constitutes another point of difference between the two organisms.

Pathology

As a result of examination of early skin lepromata, NOËL and Soeur MARIE-SUZANNE (p. 367) show that the first stage in the evolution of a lesion is hyperplasia of cells of the reticulo-endothelial system. The lymphocytic reaction comes later. The same authors (p. 754) note that they have never been able to find *Myco. leprae* in the lesions of tuberculoid leprosy, but that this form constantly shows an eosinophile reaction, which never occurs in lepromatous forms. In tuberculoid leprosy giant cells are much more numerous than in lepromatous leprosy, and are surrounded by epithelioid cells as in tuberculosis ; they never contain the bacilli as they do in lepromata.

ARNOLD (p. 546) discusses leprosy macules, which apparently represent acquired allergic hypersensitivity to *Myco. leprae*. This may be enough to destroy the organisms, or it may be insufficient, in which case a lepromatous form may develop.

A study of reticulum formation in the three forms of leprosy is reported by VEGAS *et al.* (p. 631).

A study of the cells in the bone marrow in leprosy is recorded by BINAGHI (p. 755).

Tests

A lepromin has been prepared by CAMPOS (p. 247) [and also by CONTRERAS *et al.*, p. 369] from spleen and liver, rich in leprosy bacilli, taken at autopsy of a lepromatous patient. It was comparable with lepromin made from skin nodules. In this way large quantities can be prepared. SCHUJMAN (p. 472) tested this lepromin and found that the results agree with those obtained with ordinary lepromin in 96 per cent. of cases. BASOMBRIO and GATTI (p. 754) refer to lepromin prepared in this way. Although it presented results which were not concordant with those of ordinary lepromin when read 48 hours after the skin test in 15 of 22 patients tested, the late results were much more concordant, and the lepromin is therefore very useful.

DE FARIA (p. 248) describes a case in which the lepromin test changed from negative to positive as the lesions changed from lepromatous to tuberculoid.

DHARMENDRA and MUKHERJEE (p. 755) have studied lepromin reactions carried out within and around leprous macules.

From a study of the Mitsuda and the von Pirquet reactions in children with undifferentiated or tuberculoid leprosy, FLOCH and DESTOMBES (p. 1095)

conclude that people from areas where tuberculosis is endemic show a certain degree of resistance to leprosy, but not vice versa.

ROSEMBERG *et al.* (p. 1095) gave BCG in one or more doses to children who had been removed at birth from leprous parents, and who were both Mantoux- and Mitsuda-negative. Almost all of them became positive to these tests as a result of the BCG. The authors point out that the Mantoux test indicates allergy, whereas the Mitsuda indicates resistance. Repeated injections of killed acid-fast bacilli, or of BCG, provoke nodules at the point of injection earlier and earlier as the injections are repeated. This occurs in normal subjects and in those with tuberculoid leprosy, but not in those with lepromatous disease. TISSEUIL (p. 1096) calls these " accelerated reactions ".

Ross (p. 471) has investigated certain tests in leprosy, including the thymol turbidity and cephalin-cholesterol tests, and the albumin-globulin ratio. In most cases one or more of these showed abnormality, and these changes appear to be the result of widespread disorder of function of the tissues, involving the reticulo-endothelial system. A study of blood cholesterol, calcium and glucose has been carried out by LANCEPLEINE (p. 755). There was evidence of some undue lowering of these substances, especially in lepromatous cases.

SINGH (p. 49) discusses the false positive serological reactions for syphilis, which may be found in leprosy. Ross and GEMAR (p. 1000) discuss the Kolmer and Kahn tests in leprosy in relation to the cardiolipin and standard antigens. There was a very high proportion of positive reactions with each test.

Clinical features

GHOSH (p. 48) writes of the diseases which may simulate leprosy, particularly oriental sore, tuberculosis and syphilis of the skin. He discusses differential diagnosis.

MURDOCK (p. 370) has been impressed by the importance of thickening of the peripheral nerves in the diagnosis of leprosy, and makes the point that many more nerves than the few usually examined are thickened, though the great auricular and the ulnar are most commonly affected, followed by the superficial peroneal and the transverse cervical. In children thickening of nerves may be the first sign of leprosy.

GOUGEROT (p. 370) discusses the diagnosis and recognition of invisible lesions of skin and mucous membranes ; one method used is the intravenous injection of methylene blue, which produces coloration of these lesions, from which biopsy specimens can then be taken.

RYRIE (p. 369) thinks that the test for tactile anaesthesia should be made only with a fine point of cotton wool, on the shaved skin. A diagnosis of leprosy should not be made when there is no skin lesion, thickened nerve, or muscle wasting.

In Purulia, India, lepra reactions are most common in the hot, dry season. TEICHMANN (p. 49) states that severe reactions tend to follow diseases like pneumonia or dysentery ; they occur in both lepromatous and tuberculoid disease, and are allergic in origin. DE SOUZA LIMA (p. 547) discusses the lepra reactions.

A study of lepromatous leprosy is reported by ROMERO *et al.* (p. 371).

PARDO CASTELLÓ and PIÑEYRO (p. 370) give an account of the form of leprosy known as Lucio or lazarine leprosy. The histological structure of this bullous form is that of tuberculoid leprosy with a necrotic core, which breaks down and causes destruction of the deeper tissues, even down to bone. The lepromin test is always positive, and the tendency is to spontaneous recovery. Bullous lesions may be the predominating feature in a number of cases of leprosy, and may occur in lepromatous or tuberculoid forms ; it is not necessary, therefore, to consider lazarine leprosy as a separate form. ARNOLD

(p. 1094) has published an account in English of this form of leprosy, and a case is described by OBERMAYER *et al.* (p. 1098).

DE AGUIAR PUPO (p. 547) stresses the fact that leprosy of the indeterminate type may evolve in the direction of either the lepromatous or the tuberculoid type. JAVIER GUILLÉN (p. 1097) subdivides this form into three groups, details of which should be sought in the original.

SCHUJMAN (p. 1097) describes a case of tuberculoid leprosy which progressed to the lepromatous form. This is very unusual, and only reactional tuberculoid cases with weak or negative Mitsuda reactions evolve in this way [but see DAVISON, below].

From examination of a large number of patients, DHARMENDRA and SEN (p. 368) [see also p. 1094], show that a small proportion with neural skin lesions negative for leprosy bacilli show the organisms in nasal mucus, and that the nose should be examined in such cases. In neural cases with positive skin the nose is positive in over one-third ; in doubtful and lepromatous cases the proportion positive is much higher.

DAVISON (p. 471) argues strongly against the general opinion that neural leprosy is only very slightly infective, and he thinks that in Africa the neural form quite often changes to the lepromatous form. He therefore argues that no precautions should be relaxed in these cases.

Oscillometric studies of the peripheral circulation have been carried out by BARNETSON (p. 756) in nerve leprosy, and are useful in diagnosis of obliterative lesions of arteries of the limbs. He (p. 756) has also studied the effects of applying heat and cold. The peripheral vessels retain their capacity to dilate, but there is failure of reflex vaso-dilatation which is the result of destruction by leprous neuritis of vasomotor fibres in the peripheral nerves.

A book on leprosy of the eyes, by VALE, is reviewed on p. 176. Visible lesions of the iris, and at the junction of the iris and cornea, were seen in a number of patients with lepromatous leprosy in whom URRETS ZAVALIA (p. 1000) performed gonioscopy, or examination of the angles of the anterior chamber of the eye. The early findings in eye, ear, nose and throat in children with early leprosy are described by ELLIOTT (p. 1096).

Although the lepra reaction often leads to improvement in the skin conditions, its effect on the eyes, when they are involved in it, is always deleterious. SOTO (p. 248) shows that such cases should be treated promptly and with vigour.

Treatment

The chief therapeutic activity of the period reviewed has been the use of the parent sulphone, diaminodiphenylsulphone (DADPS). The pharmacology of this substance has been studied by SMITH (pp. 50, 372, 860), who shows that it is very well absorbed from the bowel, and is slowly excreted in the urine ; it is more easily absorbed than sulphetrone, but in doses up to 0·3 gm. daily it does not accumulate in the blood. Where there is kidney dysfunction, however, the daily dose should not exceed 0·1 gm. It does not give rise to more anaemia than sulphetrone. On the other hand FLOCH *et al.* (p. 1100) claim that DADPS accumulates in the tissues after continued dosage and that in daily doses of 0·26 gm. the blood level is higher than in doses of 0·2 gm. and only three-quarters of the 0·2 gm. are excreted daily in the urine. SIMPSON and MOLESWORTH (p. 860) describe a test for DADPS in blood, urine and various organs. In the organs the highest levels found were in liver and kidneys.

DADPS is given either by mouth or by injection. LOWE and SMITH (p. 474) and LOWE (pp. 475, 1000) report their experiences with daily oral doses up to 0·3 gm. The action is favourable, the toxic effects few, and the course of treatment cheap. In his later paper LOWE advocates different schedules of

0·9 to 1·8 gm. weekly, the doses being given daily except Sundays, or on alternate days, or twice each week. Lepromatous disease reacts to each schedule, but in tuberculoid leprosy there is a more rapid response to daily administration. [It is perhaps important to note that in later work LOWE (this *Bulletin*, 1951, v. 48, 374) advocates smaller doses, up to 0·8 or 1·2 gm. weekly. These are as effective as, and less toxic than, the higher doses.]

FLOCH and DESTOMBES (pp. 548, 757, 1100) have used DADPS in doses up to 0·3 gm. daily, with a rest for one day each week and for one week each two months. Their reports are uniformly favourable, especially in lepromatous disease. They (p. 1101) have also used succinyl DADPS with good results in a few lepromatous cases ; the doses were 1 to 1·2 gm. daily by mouth, or up to 1 gm. by intramuscular injection. DADPS was used, suspended in oil, for deep subcutaneous injections by MOLESWORTH and NARAYANASWAMI (p. 474). These were given once or twice each week to a weekly total of 1 gm. of the drug, with good results.

BERTI *et al.* (p. 372) discuss the production of DADPS and its derivatives on a large scale in Brazil.

Treatment by the sulphones in general is referred to by several authors, usually favourably. CONTRERAS and his colleagues (pp. 372, 373) write in this sense, especially in reference to sulphetrone, and SLOAN *et al.* (p. 1098) and DE SOUZA LIMA (p. 1098) record good results in all forms of leprosy. FLOCH and DESTOMBES (p. 1099) found the sulphones useful in a moderate proportion of indeterminate and tuberculoid cases, but note that they are far more effective than chaulmoogra in preventing the development of reacting tuberculoid into lepromatous cases, and they therefore have a prophylactic value. These authors (p. 550) maintain that the occurrence of a lepra reaction during the course of sulphone treatment should not be allowed to interfere with the course, unless there are febrile or ocular reactions. A similar opinion is expressed by DE SOUZA LIMA and DE SOUZA (p. 373), who describe a pseudo-reaction which occurs in the early stages of treatment with sulphones. This is usually a favourable response and should be regarded as an indication for increased dosage.

The French equivalent of sulphetrone (3668 R.P. Rodilone, Cimédone) has given good results in the hands of LAVIRON *et al.* (p. 549, 758), BASSET *et al.* (p. 549) and SCHNEIDER (p. 758). The first authors point out that chaulmoogra should not be forgotten ; it has undoubtedly a value.

Favourable accounts of sulphones are given by HAMERS and HERMANS (p. 139) (Diasone and Promin), MACDONALD (p. 51) (Diasone) and DE MOURA (p. 1099) (Diasone) ; the last states that many patients were so improved that they could be allowed out of the institution without danger, to attend as out-patients. JOHANSEN *et al.* (p. 550) at Carville have used promacetin, a sulphone of low toxicity which does not break down to DADPS. It is active on oral administration in comparatively small doses, and does not produce dangerous blood levels. RHEINBOLDT *et al.* (p. 548) have used various sulphones, and also para-aminosalicylic acid (PAS), but results are to be reported later. DHARMENDRA (p. 632) has found PAS less effective than the sulphones, but it might usefully be employed with them.

Thiosemicarbazones have been used with some success by HOHENNER (p. 374) in one lepromatous case, and by RYRIE (p. 1101) in a few lepromatous and tuberculoid cases ; further trials are indicated.

GENÚ and DE OLIVEIRA LIMA (p. 551) have been unable to observe any good results from the treatment of leprosy with Rongalita (methanal sulphoxylate of sodium), which had received favourable notice from workers in Argentina.

Baranger (p. 249) has studied the spontaneous alterations which take place in chaulmoogra derivatives as a result of exposure to air. Peroxides are formed, and their constitution and therapeutic activity are being investigated.

Massive doses of vitamin D were given to 8 leprous children, in addition to the sulphones, and Herrera (p. 374) reports good results in most of them. Floch and Destombes (p. 551), however, cannot report much success with large doses of vitamin D 2 in tuberculoid and undifferentiated leprosy.

Barba Rubio *et al.* (p. 758) have used a preparation of vitamin E with some success for the treatment of leprosy patients with wasted muscles.

Extirpation of primary lesions in 7 cases is described by Boenjamin (pp. 472, 552). None of these patients had evidence of other lesions, and 3–12 years later there was no sign of spread or recurrence.

Dostrovsky and Ticho (p. 374) have used auto-serum from a cantharides blister raised on a healing area of skin, for direct instillation into the eye of the patient, who also had ocular leprosy. The condition cleared up remarkably well, though previous treatment with gold preparations had not apparently produced much effect.

Horan (p. 473) has used nerve block with procaine in the treatment of neuritis in leprosy ; relief is immediate and in most cases there was no recurrence for 3 months. Ulcers of the feet respond well, vasospasm is relieved and normal circulation is restored. For lepra reactions intravenous infusions of procaine have been used with success.

Leprolins made from cultures of acid-fast organisms have been used with success in the treatment of perforating ulcers by Caldeira (p. 51), who administered them by intramuscular injection close to ulcers.

The prevention of deformities in leprosy is discussed in detail by Teichmann (p. 51), who points out that patients with any type in time develop anaesthesia of the extremities and become liable to burns and injuries.

Control

Muir (p. 552) discusses the question of leprosy and industry in India. Persons with lepromatous lesions are dangerous to others and should be given an agreed period of leave before their services are dispensed with. Persons with tuberculoid leprosy should be given leave for 6 months or more, during which period they should be treated. Surveys are necessary, and treatment of tuberculoid or early lepromatous cases should be undertaken at clinics under a trained medical staff.

Winter (pp. 475, 1102) discusses the South African laws relating to leprosy, and the policy for control adopted there. He also refers to the fact that some patients with nerve leprosy negative bacteriologically may become infective. Compulsory segregation of patients likely to cause infection is legally possible, but should be kept in the background. The system of releasing on probation those in institutions who have been bacteriologically negative for 12 months is working well. They are examined periodically, and very few are found to become infective again. Agricultural colonies are well organized, and it seems that leprosy is now under control.

As a result of the activities of the mobile hygiene and prophylaxis service in French West Africa, the cases of leprosy under observation have increased very greatly in four years ; there are 34 hospital treatment centres (Lauret, p. 756).

The organization of a leprosy service in Indonesia, to replace that which was destroyed during the war, is discussed by Gramberg (p. 139), who thinks that the best that can be hoped for is a leprosy-tracing service and a treatment service. Ascertainment centres should be created, linked with out-lying clinics, where patients can stay for a few months until they are assessed, and

sanatoria and leprosaria are needed. Leprosaria are for hopeless cases, but they should not be prisons. A special organization is suggested for these services.

An account of a small hospital and out-patient department for leprosy in part of China is given by FRASER (p. 473).

ROTBERG and BECHELLI (p. 250) make suggestions for the organization of treatment and isolation of leprosy patients, and for the examination of contacts.

Rat Leprosy

HANKS and SOULE (p. 250) have failed in attempts to cultivate the rat leprosy bacillus.

In discussing the factors which may influence the experimental transmission of rat leprosy, HANKS (p. 1103) concludes that the bacilli should be freed from excess of tissue débris, should be inoculated at one site only, and in moderate rather than large doses.

In rat leprosy promin suppressed the infection and increased the length of life, but CARPENTER *et al.* (p. 52) show that streptomycin was much less active, and Diasone and penicillin not at all. *Charles Wilcocks*

MALARIA

EICHLER, W. Brackwasserverträglichkeit europäischer Anopheles-Larven und die Verwendung des Aräometers in der Brutplatzdiagnostik zur Malariabekämpfung. [**Tolerance of Brackish Water by European Anopheles Larvae and the use of the Hydrometer for Recognizing Possible Breeding Places in Malaria Control.**] *Ztschr. f. Hyg. Zool.* 1949, Feb., v. 37, No. 2, 42–9, 2 figs. [14 refs.]

In the planning of malaria control campaigns it must be remembered that some *Anopheles* larvae (*A. m. atroparvus* and *A. sacharovi*) are known to breed in brackish water. Although the salinity of standing water can be judged from the surrounding plants, *Statice*, Tamarisk and *Chenopodium* being characteristic, or by the taste of the water, some more accurate method of measuring salinity is desirable. This can be done with a hydrometer, which measures the specific gravity of the water. However, in many cases, small puddles and hoofmarks, while large enough for mosquitoes to breed in, are too shallow to float a hydrometer. For such cases, it is advisable to carry a tube in which the tests can be made. The author generally uses one of the tubes used in urine analysis, called a ureometer. The hydrometer should be calibrated for densities from that of pure water (1·000) to that of sea water (1·030), and this paper includes a table converting specific gravities in this range to percentage sea-water, percentage of sea salts, percentage of sodium chloride and percentage of chloride.

Anopheles maculipennis atroparvus breeds in Holland in waters with a chloride content of 0·08–0·25 per cent. and in those in Germany between 0·03–0·07 per cent., but most of its breeding places in North Germany are in fresh water. In Rumania, on the other hand, the species is closely tied to brackish water, characterized by the plants *Sueda maritima* and *Statice germanica*. Laboratory experiments have shown the highest rate of survival in 26 per cent. sea-water [*i.e.*, about 0·4 per cent. chloride].

Anopheles maculipennis labranchiae is again a coastal species but prefers warmer water. Chloride percentages of about 0·7 are reported from its breeding places in Italy.

Anopheles sacharovi prefers warm water too, but tolerates high salinities (up to about 1·3 per cent. chloride). In the laboratory, it shows a survival optimum at 0·37 per cent. chloride. *J. H. Sudd*

DE FRANCESCO, F. & D'IGNAZIO, C. Sindromi addominali acute e malarie. [**Acute Abdominal Conditions and Malaria.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Mar., v. 32, No. 3, 177–94. [17 refs.] English summary (4 lines).

Clinical notes are given on each of 11 patients seen in Addis Ababa. There was a history of malaria in each case. Malaria parasites were demonstrated by the thick-film method in 6 at the time of the acute abdominal attack, but could not be found in 3 others. In one patient the malaria parasites were only demonstrated after administering adrenaline to produce contraction of the spleen, while in the remaining case the peripheral blood did not show parasites until 3 blood transfusions had been given. One of the patients died : he had refused treatment with adrenaline and quinine ; he later developed gangrene and perforation of the appendix and died after operation. All the other 10 patients were treated by the Ascoli method of adrenaline and quinine ; 4 had to have their appendix removed, another had to lose his gall-bladder because of a suppurative cholecystitis, and another patient had to be operated on for a perforated duodenal ulcer. All 10 patients recovered. The advantages of local " block " anaesthesia with novocaine are discussed. *J. Cauchi*

FALCO, Elvira A., RUSSELL, P. B. & HITCHINGS, G. H. **2,4-Diaminopyrimidines as Antimalarials. I. 5-Aryloxyl and 5-Alkoxyl Derivatives.** *J. Amer. Chem. Soc.* 1951, Aug., v. 73, No. 8, 3753–8. [Refs. in footnotes.]

FALCO, Elvira A., DUBREUIL, Shirley & HITCHINGS, G. H. **2,4-Diaminopyrimidines as Antimalarials. II. 5-Benzyl Derivatives.** *J. Amer. Chem. Soc.* 1951, Aug., v. 73, No. 8, 3758–62. [Refs. in footnotes.]

RUSSELL, P. B. & HITCHINGS, G. H. **2,4-Diaminopyrimidines as Antimalarials. III. 5-Aryl Derivatives.** *J. Amer. Chem. Soc.* 1951, Aug., v. 73, No. 8, 3763–70, 2 figs. [Refs. in footnotes.]

JONES, T. W. T. **How Anti-Malaria Oils kill Anopheline Larvae.** *East African Med. J.* 1950, Dec., v. 27, No. 12, 466–73, 4 figs. [15 refs.]

A brief account is given of old theories put forward to account for the killing of mosquito larvae by oils, and how experimental evidence has proved them wrong. The theories in question were :—

1. Depriving the larvae of access to air.
2. Lowering the surface tension of water.
3. By oil entering and blocking the tracheae.
4. Toxic vapours inspired by the larvae.
5. Solubility of toxic substances present in the oil.

The penetration and the effect of the oil is studied. Oil enters the spiracles as the larvae break through the oil film, in order to reach the air, and penetrates to varying distances according to the amount which has entered. When the oil is insufficient to fill the tracheae and remains at the posterior end, the larvae

may live for several days, though generally failing to pupate. When the tracheae are full, death occurs within 24 hours and is more rapid when the finest tracheoles are penetrated. The rate of entry depends directly on the thickness of the film and its wetting power, and inversely with the viscosity of the oil.

The main determining factor for toxicity is not the physical presence of the oil in the tracheae but the toxic substances, such as aromatics present in the oil. The presence of aromatics must not appreciably alter the properties of the oil necessary for rapid entry, for it is only after entry that their toxic properties are felt. The oil must not evaporate readily and yet oils with high aromatic content or low viscosity are generally highly volatile. Therefore an anti-malarial oil is a compromise of a blend of different oils which assures quick entry, sufficient toxic substances to kill in a short time, and which will give a stable film for long periods. The author recommends a dosage of 15–18 gallons per acre. *T. E. Fletcher*

NAIR, C. P. **Studies on DDT Barrier Spray with reference to Local Rainfall and Seasonal Incidence of Mosquitoes.** *Trans. Roy. Soc. Trop. Med. & Hyg.*, 1951, June, v. 44, No. 6, 741–6.

GREENBERG, J. & RICHESON, Edna M. **Effect of 2,4-Diamino-5-(p-Chlorophenoxy)-6-Methylpyrimidine and 2,4-Diamino-6,7-Diphenylpteridine on Chlorguanide-resistant Strain of** *Plasmodium gallinaceum.* *Proc. Soc. Exper. Biol. & Med.* 1951, May, v. 77, No. 1, 174–6. [11 refs.]

It has been shown by GREENBERG [this *Bulletin*, 1950, v. 47, 443, 1186] that the biological activities of paludrine (proguanil, chlorguanide), some 2 : 4-diaminopyrimidines and 2 : 4-diaminopteridines resembled one another in some respects. In view of these facts it seemed possible that a strain of malaria resistant to one of these drugs might prove resistant to the others. The possibility has now been investigated in the case of *P. gallinaceum*. A strain of the parasite resistant to proguanil was used in tests with 2 : 4-diamino-5-(p-chlorophenoxy)pyrimidine and 2 : 4-diamino-6,7-diphenylpteridine. Chicks were inoculated intravenously with 16×10^6 parasitized erythrocytes of the resistant and parent strain and drugs were administered twice daily for 4 days, starting a few hours before inoculation. On the day after the last dose of drug, stained smears were made and the parasites counted. The minimal effective doses of the three drugs defined as "the amount which will cause a 75% reduction in parasitaemia" was determined. The proguanil-resistant strain was found to be also resistant to the pteridine but as sensitive as the parent strain to the pyrimidine. The latter in combination with proguanil did not produce a synergic effect. A useful table summarizes the known facts regarding synergic effects of these 3 substances with sulphonamides, inhibition of each by folic acid and the data obtained in the present investigation. The fact that the pyrimidines do not readily give rise to resistant strains, are active against the proguanil-resistant form of *P. gallinaceum* and as a group have very marked activity against this parasite [FALCO *et al.*, this *Bulletin*, 1951, v. 48, 872] may prove to be important in the treatment of human malaria.

J. D. Fulton

TRYPANOSOMIASIS

RAYNAL, J. H. Sur l'incidence de la maladie du sommeil en Afrique Equatoriale Française. [**The Incidence of Sleeping Sickness in French Equatorial Africa.**] *Rev. Coloniale de Méd. et Chir.* 1951, Feb. 15, v. 23, No. 187, 32–4.

The medical and sanitary services of French Equatorial Africa have been engaged in efforts against sleeping sickness for more than 40 years by means of mass treatment and measures directed against tsetse flies. The table below shows how the work increased and the infection receded between 1924 and 1946.

Period	Total examined per year	New cases per 1,000 examined	New and old cases per 1,000 examined
1924–6	665,000 to 790,000	13 to 14	40 to 50
1934–6	1,134,000 to 1,160,000	9 to 10	35 to 45
1944–6	1,400,000 to 1,750,000	2·5 to 5	19 to 29

The regional distribution of sleeping sickness in 1946 is briefly outlined, the most heavily infected territory being the Moyen Congo, where the banks and tributaries of the Oubangui, the Congo and the Niari showed infection rates up to 113 per 1,000.

In 1946 the technique of mass chemoprophylaxis by pentamidine or lomidine was introduced. It has since been greatly extended with highly encouraging results [see RAYNAL & LOTTE, p. 960]. *E. M. Lourie*

EAST AFRICA HIGH COMMISSION. **East African Tsetse and Trypanosomiasis Research and Reclamation Organization. Annual Report 1950** [LESTER, H. M. O.]. **Tsetse Research** [POTTS, W. H., 11–13]. **Trypanosomiasis Research** [WILLETT, K. C., 33–5]. **Tsetse Reclamation** [LEWIS, E. A., 36–56]. 56 pp., 5 figs. [27 refs.] 1950. Nairobi.

The present annual report is a more valuable document than many similar reports of Government research organizations. For one thing it contains a statement of general policy, and for another it deals, at unusual length, with the research and reclamation which is in hand. The reader has a choice between the Director's more general account, which in itself runs to 10 pages, and the more detailed papers which appear under the names of the senior members of the staff.

In the report by the Director (Dr. H. M. O. LESTER) it is made clear that within the last few years a change has come over tsetse research, which is now related to trypanosomiasis and also to the practical problem of the development of East Africa. Research, both on the fly and the trypanosome, is carried out with practical ends in view and in some relation to the great problems of agriculture and usage of land. We feel that this will certainly lead to a short-term success, because so much research which has already been done will now be brought into practical use. But whether this rather " practical " policy in matters of research pays in the long run is less certain : there is surely some

danger that unless the research is free it will be confined to objectives which can be perceived, that is to say, to the immediately obvious ones, rather than to the essential problems.

The section on research on tsetse flies (by W. H. Potts) runs to some 20 pages and refers to much work of great interest. We note that the long-continued experiment in Block 11, near Shinyanga, from which annual fire has been excluded for many years, and in which some discriminative clearing has been practised since 1936, has resulted in the elimination of *G. swynnertoni* : the block contained about 3 of these insects per square mile in 1950 and these are assumed to be immigrants. In an area used as a control, in which the vegetation was originally similar to that in Block 11, the population is estimated at 4,500. We venture to regard this as the conclusion of a long and most interesting experiment, though one may doubt whether the land from which fire has been excluded and in which the thicket has become dense, can be used for any practical purpose. The caution which should be exercised in interpreting results is well shown by the fact that *G. pallidipes* is also exceedingly rare in the same block : but it is equally rare at present in the control area, where its scarcity is due to some unknown natural cause.

The experiment in the destruction of game in a large block not far from Shinyanga is almost complete. The area of some 700 square miles originally contained three species of tsetse, *G. morsitans, swynnertoni* and *pallidipes*. The destruction of game commenced in July 1945 and since that date a total of about 8,500 head of animals have been destroyed. The large game animals have, we understand, been completely eliminated from the area and there has been a great reduction in the impala and reed-buck, both of them antelopes which might be said to be of the middle size. No attempt has been made to reduce the numbers of smaller antelopes and of wild pig, and very considerable numbers of them continue to exist in the experimental area. It is to be understood that no other measure against tsetse has been undertaken in this particular experiment, the results of which are striking and of great value. For instance, in 1946 the numbers of *G. swynnertoni* caught per month in a standard way within the game destruction area was 404 and in the control area 150. In 1947 and 1948 the numbers in the two areas were not very different and in 1949, and still more in 1950, the insect practically disappeared from the area in which game was destroyed : in the last year only 7 flies were caught in twelve months in that area, whereas in the control the figure was 75 per month ; the figures for the other two species of *Glossina* are comparable, and the report takes the view that *G. morsitans* has become extinct. As to *G. pallidipes*, in spite of the very great reduction in the experimental area, the author is cautious in drawing a conclusion, because the insect is so elusive and because there has been a great natural reduction in the control area. Concurrent work on the physiology of the flies supports the view that the cause of their disappearance was indeed starvation, owing to the game destruction : this starvation was objectively measured, by estimating the amount of fat in the insects.

In carrying out fly-rounds, previous methods have been modified in a number of somewhat technical ways. One notes the study of precise factors in relation to the vegetation and the use of aerial photography. A fuller and more detailed account of these newer methods would be of value and we hope to see it in print before long. Suffice it to say that it appears that the new methods give more precise information as to the spots which are essential in the economy of the insects. This work in the field is closely linked to laboratory studies on the behaviour of the insect in relation to intensity of light and other physical factors.

The method worked out by Jackson for estimating actual populations per square mile as distinct from numbers of flies caught per hour or per mile

continues to be developed and to yield results of great interest. The work is perhaps the most important scientific work that ever came out of Shinyanga, where it is evidently fundamental to the field work in all other directions. One only regrets that no one has yet been able to extend this method and make use of it in West Africa, where so much invaluable, but perhaps qualitative work, has been carried out. An interesting new idea is the " standard availability ", which is the proportion of the fly population which may be caught in a standard way. It seems that, in its own habitat, at Kakoma, Tanganyika, the standard availability of *G. morsitans* is about 10 per cent., whereas the figure for *G. swynnertoni* at Shinyanga is about 2 per cent. In accepting these calculations one may convert ordinary fly round figures of so many non-teneral male flies per 10,000 yards, to a figure per square mile, a very important advance because it relates much of the old work to the new and increases the value of some old work which had appeared to be only qualitative.

It is not possible to deal, except in the briefest way, with many other points of great interest that emerge in this part of the report. Making use of the newer techniques in fly survey, FORD is relating his entomology to the use of land by mankind. The long-term cycles in the apparent density of fly continue to be investigated. The important work of BURTT on the conditions under which trypanosomes develop an infection in tsetse is being continued. An investigation on the biology of *G. austeni* in Zanzibar has been brought to an end and will, we hope, soon be made available. A considerable amount of scientific work on game has been undertaken : for instance, on the estimating of the number of animals by thread fences which are broken, some by large and others by small animals : studies on breeding cycles of certain species of game : important work in conjunction with the Lister Institute, on the development and use of precipitin tests for identifying the blood meals of tsetse and other biting insects. A map has been compiled and printed giving the distribution of species of tsetse in East Africa, on a scale of 1 : 500,000.

In reporting on research on trypanosomiasis, Dr. K. C. WILLETT brings up to date an account of the work at Tinde, started by CORSON and continued by FAIRBAIRN. Little active work has gone on in 1950, but the strains of trypanosomes have been maintained. The report reminds us that the original strain of *T. rhodesiense* was obtained by feeding a batch of *G. morsitans* on an untreated human case in October 1934. The flies were fed on a sheep and the strain has been maintained on a succession of sheep up to the present day, always by the bite of infected flies. During this time there has been a cyclical variation of virulence of the strain to sheep : the remarkable regularity of this variation is shown in a graph. The infectivity of the same strain to man (that is to say, the proportion of men infected year by year after being bitten by infected tsetse) is positively correlated with the length of life of infected sheep, *i.e.*, negatively correlated with the virulence to sheep. Tested on human volunteers, and always by transmission by tsetse, the strain has never lost its power of infecting man : even after its maintenance in successive sheep for sixteen years, 7 out of 10 volunteers were infected in 1950. One of the three who failed to develop infection showed the rare syndrome of a marked and completely typical reaction at the site of the bite, though trypanosomes were never found either by puncture of the swelling or in the blood-stream.

It will be remembered that a branch of the original sheep strain was maintained for a number of years in a variety of antelopes, generally in Thompson's gazelle, and always by the bite of infected *G. morsitans*. This strain was discarded in 1949 as a measure of economy of work, having demonstrated clearly enough that *T. rhodesiense*, originally derived from a sick human being, can be maintained through a large number of passages through antelopes, and always by fly, not syringe.

The subject of tsetse reclamation is dealt with by E. A. Lewis. Present policy is to bring to an end a considerable number of small field experiments in tsetse control, and to concentrate on three larger schemes. Much time has also been given to visits to different parts of East Africa and to giving advice to the separate governments on their own local schemes for tsetse control. The writer emphasizes the importance of using human settlement as an assurance against re-infestation by fly and the report gives ample evidence of the attention which the entomologist now gives to the use of land for cultivation or for pasture. One notes also that the tsetse reclamation is intimately associated with the scientific studies on the insect, carried out by other sections of the Organization.

In considering control of such species of tsetse as *G. morsitans* it is evident that one's purpose is to maintain or increase the area of grass at the expense of thicket. The grasslands are not generally speaking " climax " because, if left entirely on their own, nearly all of them will develop in the direction of bush or woodland. They have, however, for immense periods been maintained as grassland, partly by the annual fires and partly by grazing (by cattle or game). The use of fire to check the development of bush is therefore one of the most valuable methods of controlling certain of the wide-ranging species of tsetse. The present report calls attention to cases where bush has advanced, and tsetse with it, into areas where annual burning was not carried out. The destruction of bush by this method is valuable not only as a method of attack on tsetse themselves but also by tending to reduce breeding places.

The report gives a number of interesting details of reclamation schemes which are at present in hand. One observes that at least in the Tabora area of Tanganyika, *G. morsitans* may be greatly reduced, perhaps eliminated, from large areas by the discriminative clearing of a narrow band of bush lying just above the great seasonal swamps and below the main areas of woodland. Why this small amount of clearing should eliminate this insect from large areas is not known, but as an empirical method it appears to be cheap and effective. Figures are quoted from fly-rounds carried out in areas dealt with by this method (and no other) and also in control areas which have not been affected. This section of the report gives an impression of careful, critical work and of the use of a large number of methods, each of them thought to be appropriate to the particular conditions.

In one isolated fly belt the apparent population of *G. swynnertoni* was reduced by 98·1 per cent. after four applications of Gammexane smoke at fortnightly intervals. No other measures were undertaken, but observations were continued by fly-boys to discover at what rate the remaining population of the insect might recover. After the last smoking in October 1949 there was a rise in the " apparent density " of the insect from 0·44 to 0·95 in January 1950 and 2·95 in the following month. There was then a period in which the records may have been unreliable but by August the figure had risen to 5·29, which may be contrasted with 23·16 twelve months earlier, before the first application of the insecticide. It seems then that the recovery of the population of tsetse is, in this case, very slow.

[The section on reclamation is open to criticism. No information is given of the cost of the individual schemes : one may surely put forward the view that in the practical business of controlling any pest the matter of cost must be entered into in some detail. It is, indeed, a vital question whether control is " worthwhile " or whether this method, or that, is cheaper in the long run. If, as the Director states in his introduction, " the long term aim is to assist in the proper development of East Africa " figures of costs must be made available in considerable detail. They should moreover, we think, be set out not only as cost in money but as labour, that is to say in man-days.] *P. A. Buxton*

PIRES, F. A. **Relationship between *G. brevipalpis*, Newst., and the Hippopotamus on the Maputo Valley—Portuguese East Africa.** *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 143/0*, [*Léopoldville (Congo Belge)*]. 8 mimeographed pp., 3 graphs (2 folding). (Dated Lourenço Marques, July, 1950.)

The author's investigations have been carried out on the Maputo River in Portuguese East Africa. There is a gallery of evergreen forest along the river bank, in which it is stated that the only wild mammal (presumably the only *large* mammal) is the hippopotamus. There are some crocodiles in the river. Outside the gallery forest is open grassland, in which there are small clumps of evergreen trees, growing on patches of soil which lie slightly above the level of the grassy plain. Cattle graze in the plains and the hippopotamus goes out there at night.

Glossina brevipalpis, which appears to be the only species of tsetse present, lives by day in the forest but may be caught at dusk in the grassland. It breeds particularly in the loose soil under the clumps of evergreen trees.

The author devised a scheme of control which was based first on an attempt to drive out the hippopotamus "there not existing the pre-occupation of killing them". He estimated there that were some thirteen of these animals per kilometre of river, and a total of two to three hundred all told. The campaign was followed by rapid decrease in the number of *G. brevipalpis*, but no counts were available from any undisturbed area.

In the second stage of the campaign, the cattle were dipped in a mixture of DDT and BHC, with the intention of killing tsetse that landed on them.

[The reader will have no difficulty in discovering that "red duck" is a misprint for "reed buck".] *P. A. Buxton*

ROLLO, I. M. & WILLIAMSON, J. **Acquired Resistance to 'Melarsen', Tryparsamide and Amidines in Pathogenic Trypanosomes after Treatment with 'Melarsen' Alone.** [Correspondence.] *Nature*. 1951, Jan. 27, 147–8.

The old laboratory strain of *T. rhodesiense* that has been used for experimental work in Liverpool for very many years was made resistant to melarsen by treating serially infected mice with that substance. The strain was then found to be resistant not only to melarsen but also to tryparsamide and to synthalin and pentamidine. (Results of other cross-resistance tests are also given.)

It is already known, however, from earlier published work, that trypanosomes made resistant to tryparsamide by repeated treatment with that compound are not also resistant to melarsen or to diamidines [LOURIE & YORKE, this *Bulletin*, 1939, v. 36, 221 ; VAN HOOF, *ibid.*, 1947, v. 44, 1048 ; WILLIAMSON & LOURIE, *ibid.*, 1948, v. 45, 413]. These earlier findings may be reconciled with those now reported by the fact that both melarsen (by virtue of its melamine ring) and pentamidine (as well as synthalin) contain groupings of the amidine type, -C(-N=)=N-, which is not present in tryparsamide. Long-continued contact of trypansomes with tryparsamide therefore does not include, for these trypanosomes, any experience of contact with the amidine moieties. The tryparsamide-resistant trypanosomes accordingly remain susceptible to fixation by the compounds which do contain this amidine feature, such as melarsen and pentamidine, which, once they are taken up by the trypanosomes, forthwith proceed to exercise their normal trypanocidal properties. Long-continued contact of trypanosomes with melarsen, on the other hand, provides them with the experience not only of an arsenical but also of the amidine groupings. The trypanosomes therefore develop a resistance to fixation both by an arsenical such as tryparsamide and by compounds whose molecule includes the amidine

feature. Such trypanosomes therefore become resistant not only to the substance to which they have been exposed, namely melarsen, but, concurrently, to tryparsamide and to pentamidine as well. *E. M. Lourie*

NEUJEAN, G. Contribution à l'étude des liquides rachidiens et céphaliques dans la maladie du sommeil à " Trypanosoma gambiense ". [**Spinal and Cephalic Fluids in *gambiense* Sleeping Sickness.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Nov. 30, v. 30, No. 5, 1125–1387, 3 figs. on 3 pls. [Bibliography.]

One is greatly dependent on changes in the cerebrospinal fluid in deciding on a suitable form of treatment for a case of sleeping sickness or in assessing the results of treatment. Every effort should therefore be made to extract the fullest information possible from this fluid. To this end the author has studied two portions of the fluid, one of which may be regarded as predominantly spinal and the other peri-cerebral and ventricular (described as cephalic). The technique used was that of ALAJOUANINE [" *Les Acquisitions Médicales Récentes* ", 1949, Flammarion, Paris]. It is described in careful detail, and consists essentially in withdrawing 20 ml. of cerebrospinal fluid by the usual lumbar route, then insufflating 40 ml. of air, and again withdrawing 20 ml. of fluid. The two specimens examined are the first few ml. of the first volume withdrawn and the last few ml. of the second volume. The procedure was carried out on 587 occasions in 312 sleeping sickness patients, 41 normal subjects and 11 others, and has been regularly continued since the present communication was completed.

Fluids from the 41 normal subjects showed that the cephalic portion always had a slightly higher cell count (rarely by more than 6 per c.mm.) and nearly always a lower albumin content than the spinal portion. Colloidal reactions were the same in both portions. Cell counts which can safely be regarded as normal were up to 3 per c.mm. in the spinal and 6 per c.mm. in the cephalic fluids, though 20 per cent. of normal subjects showed counts of 3 to 6·5 in the spinal and 6 to 10 per c.mm. in the cephalic fluid. No normal subject with a spinal cell count of 0–3 per c.mm. had a cephalic count of more than 10 per c.mm. However, as many as 20·7 per cent. of 69 early untreated sleeping sickness cases with spinal cell counts of 0–3 per c.mm. showed cephalic counts of more than 20 per c.mm. It is concluded therefore that as high a proportion as 20·7 per cent. of cases who would be passed as having a normal cerebrospinal fluid after a cell count on a specimen as usually obtained would in fact have an abnormal fluid. In late untreated cases cell counts on the two portions of fluid are about the same. As in normal subjects, so in early and in late untreated patients the albumin content of the cephalic fluid was less than that of the spinal fluid, except in a few cases of seriously advanced infection. Fluids studied from 60 patients who were regarded as cured 2 to 13 years after treatment at various stages of the infection, showed no greater differences between spinal and cephalic specimens than were shown by fluids from normal subjects who had never been infected.

Some of the conclusions reached on patients treated with tryparsamide at all stages of infection were that if a case is proceeding towards a relapse this is detectable by changes in cerebrospinal fluid within the first three months of treatment ; it is the cephalic fluid which gives the first signs of relapse, by an increase in, or an arrest of the decreasing trend of, the cell count ; cure is associated with return of the cerebrospinal fluid to normal (first of the spinal and then of the cephalic portion) within 6 months of treatment, except for the colloidal reactions which take much longer to become normal ; the albumin-content returns to normal rather more slowly than the cell count.

Suramin tends to restore the fluid to normal in patients in whom the initial alterations are only slight. In one-third of the cases treated when the cerebrospinal fluid was normal or only slightly abnormal, the disease was merely arrested in its development (treatment being by 5 weekly doses of 30 to 40 mgm. per kgm. i.v.). In these cases deterioration of the cerebrospinal fluid, perhaps accompanied by reappearance of trypanosomes, became evident 6 months to 1 year after treatment—a period which corresponds with the time required for elimination of the drug. Nevertheless, patients with cell counts as high as 30 or more per c.mm. are sometimes cured by suramin alone.

Conclusions were less easy to draw from cases treated by pentamidine, which was given in the form of the di-isethionate intramuscularly, in doses of 5 mgm. per kgm. A number of relapses were indicated by cerebrospinal fluid examination 3 to 6 months after treatment in cases in which the spinal fluid was initially normal or only slightly altered. In those with considerable initial alteration there were usually considerable fluctuations in the cell and albumin content during a year after treatment, strongly suggesting but not necessarily indicating persistence or further development of the nervous stage of infection.

Some patients were treated with melarsen, melarsen oxide and Mel B, all of which the author found to be unduly toxic. He prefers melarsen oxide to Mel B, the latter having been tested in 35 late-stage and previously untreated cases, the usual dosage being one or two courses of 4 intravenous injections of 3·6 mgm. per kgm. The cerebrospinal fluid returned to normal more slowly after Mel B than after tryparsamide, and this was often so slow and irregular as to make it difficult to decide whether the infection was still progressing or not.

Commenting on the fact that in a case which is beginning to relapse the cephalic portion of the cerebrospinal fluid shows an increased cell count before the spinal portion, the author points out that it is obviously the former portion which is the more intimately related to the perivascular spaces of the cerebral parenchyma. Lymphocytosis of the cerebral portion is therefore " veritably the mirror of normal and pathological activities of this parenchyma ". Stress is laid on the finding that a normal spinal fluid may be associated with an abnormal cephalic portion, because this may well account for failures of treatment by suramin or pentamidine in cases considered to be in the lymphatico-blood stage of infection. These failures may amount to as many as 25 per cent. of cases treated with either of these drugs. It is therefore a " blind and dangerous " practice to use only suramin or pentamidine for a patient whose cerebrospinal fluid obtained by the customary technique is found to be normal.

[This long and careful communication includes many very interesting points of detail to which reference cannot be made in a short abstract. The histories of 202 cases are individually recorded in tabular form. Several radiological photographs are reproduced. A long list of literature-references is arranged under subject-headings. The author is to be congratulated on breaking much new ground by his bold use of this new technique.] *E. M. Lourie*

Duggan, A. J. & Hutchinson, M. P. **The Efficacy of certain Trypanocidal Compounds against** *Trypanosoma gambiense* **Infection in Man.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 535–44. [15 refs.]

This is a report on the treatment of nearly 700 cases of sleeping sickness in Northern Nigeria after an observation-period of usually at least two years. Cases were divided into three groups as follows :—

(1) Early, in which the cerebrospinal fluid contained less than 3 cells per cmm. and 25 mgm. protein per 100 ml.

(2) Intermediate, either with cells between 3 and 40 per cmm. or with protein between 25 and 40 mgm. per 100 ml.

(3) Advanced, with cells above 40 per cmm. or protein above 40 per 100 ml.

At the follow-up investigations a cell-count above 5 per cmm. or protein content above 25 mgm. per 100 ml. was regarded as evidence of failure or relapse, except in a few cases in which the initial cerebrospinal fluid picture was grossly abnormal, when upper limits of 8 cells and 28 mgm. were accepted as normal.

Melarsen in a course of 8 intravenous injections of 15 mgm. per kgm. at 5-day intervals was at least as effective as tryparsamide in a course of 12 injections of 3 gm. at 5-day intervals. This advantage of melarsen was, however, to some extent offset by apparently greater toxicity.

Melarsen oxide in a course of 7 daily intravenous injections of 0·1 mgm. per kgm. was undoubtedly effective in a high proportion of " intermediate " and " advanced " cases, although similar results were obtained with mapharsen in a course of 7 daily injections of 0·4 mgm. per kgm. Melarsen oxide was, however, judged to be too toxic, especially in advanced cases, to justify its use on a large scale among unselected subjects.

After one or two courses of Mel B at 3·6 or 4·0 mgm. per kgm. daily for 4 days in a small series of cases there were cures at all stages of infection, but toxic effects were greater than after melarsen or melarsen oxide, precluding use of this drug under field conditions.

Pentamidine isethionate was given in a course of 7 daily injections of 0·3 gm. intramuscularly. This drug is generally thought to have little effect on patients with nervous system involvement. Results in " intermediate " cases were, however, almost identical with those given by tryparsamide. It was entirely non-toxic.

Although combined pentamidine and tryparsamide unaccountably failed to cure 3 of 10 " early " cases, this combination proved to be superior to combined antrypol and tryparsamide in " intermediate " cases.

E. M. Lourie

MONNET, A. & BAYLET, R. Etude de l'elimination urinaire du 3854 R.P. (Mel B Friedheim—Arsobal Spécia.) [**Urinary Excretion of Mel B.**] *Bureau Permanent Interafricain de la Tsé-Tsé et de la Trypanosomiase. No. 141/0,* 11 mimeographed pp. Léopoldville (Congo Belge). 1951, Jan. 20.

Estimations have been made of Mel B and of arsenic, respectively, in the urine of human subjects after the administration of Mel B intravenously in doses of therapeutic size. The drug was estimated by a modification, fully described, of the method which MONNET has already reported [this *Bulletin,* 1951, v. 48, 531], and the technique by which arsenic was estimated is also fully described.

From 1 to 7 per cent. of the Mel B injected was excreted as such, while the arsenic excreted was between 10 and 20 per cent. of the amount that was contained in the injected dose. There was no constant relationship between the amount of drug excreted unchanged and the amount of arsenic excreted. Excretion both of drug and of arsenic was maximal on the first day of treatment, irrespective of whether a single dose was given or whether it was repeated daily for several days, and excretion was practically complete 72 to 96 hours after the end of treatment. Retention of arsenic is indicated by the finding that if an interval of 10 days is allowed to elapse between two short courses of daily injections, much more arsenic is excreted on the first day of the second series of injections than on the first day of the first series.

The rapid excretion seems to justify a course of frequent injections, but the evidence of latent retention of the drug is a warning against a course of long duration. Experience has shown that it should not extend beyond 3 or 4 daily injections of 3·6 mgm. per kgm. body weight. *E. M. Lourie*

Lapeyssonnie, L. Quelques réflexions au sujet du traitement de la trypanosomiase par l'acide para-arsenophenyl-butyrique (70 A de Eagle) et en particulier de son association avec la tryparsamide dans la période nerveuse. [**Eagle's "70 A" in the Treatment of Sleeping Sickness, particularly its Association with Tryparsamide for Late Stage Infection.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1950, v. 7, No. 2, 193–8.

Clinical experience with "70 A" against *T. gambiense* infection has not been particularly successful. Against the late stages it is practically useless, and even in the early stages there have been many failures [Ceccaldi *et al.*, this *Bulletin*, 1948, v. 45, 771 ; Eagle, *ibid.*, 1946, v. 43, 1017]. The earliest trials in French West Africa, in 1944, by Combescot and Nodenot gave equally unsatisfactory results, the figures for which are quoted in the present communication. Dr. Nodenot later (1945–6) treated another series of 50 first-stage and 50 second-stage cases, which it has fallen to the present author to follow up nearly four years after treatment.

The first-stage cases received 7 daily injections of 1 mgm. per kgm. There were 12 per cent. relapses, sufficient to condemn this form of treatment for early sleeping sickness.

For the second-stage cases, most of which were very advanced and with trypanosomes in the cerebrospinal fluid, treatment was by 70 A combined with tryparsamide. There were 3 treatment-courses, as follows :—

(i) Twenty-one injections of 0·4 mgm. /kgm. 70 A together with 0·02 gm. /kgm. tryparsamide in the same syringe ; injections 3 times weekly for a 7-week course.

(ii) Same as course (i) but 2 injections per week for a 10-week course.

(iii) Twenty-five daily injections of 0·3 mgm. /kgm. 70 A, interrupted twice weekly for an injection of 0·02 gm. /kgm. tryparsamide on 7 occasions ; a 4-week course.

Toxic effects of treatment were particularly slight and the results may be summarized as follows :—

(i) Of 26 patients followed up, 19 were possibly cured and 7 died of causes other than trypanosomiasis.

(ii) Of 10 patients followed up, 7 were possibly cured and 3 died of causes other than trypanosomiasis.

(iii) Of 8 cases followed up, there were 5 cures and 3 failures.

To set against these highly successful results, two chronic patients, refractory to tryparsamide and with trypanosomes in the cerebrospinal fluid, were not benefited by combined 70 A and tryparsamide, and died of the infection.

The author does not attempt to revive confidence in 70 A given by itself, but the results when given together with tryparsamide were such that he asks what other form of treatment would be so successful and so free of toxicity in such advanced cases, which are so notoriously intolerant of drug treatment.

E. M. Lourie

Kernevez, H. & Chassain, J. Note sur les résultats obtenus en Afrique Equatoriale Française par l'emploi des diamidines dans la chimioprophylaxie de la trypanosomiase humaine (période de 1946 à 1949). [**Chemoprophylaxis of Human Trypanosomiasis by Diamidines in French Equatorial Africa, 1946 to 1949.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 5/6, 337–43, 3 figs.

Previous reports on this subject have been made by Saleun & Chassain, [this *Bulletin*, 1948, v. 45, 875] and by Kernevez & Chassain [this *Bulletin*,

1950, v. 47, 825]. The latter communication covered the period June 1946 to February 1949. The one now under review covers the same period but extends also to the end of 1949.

Since the last report, which described the application of chemoprophylaxis to three sectors, the method has been extended to a fourth sector. The rapidly increasing use of the procedure is shown by the fact that the numbers of injections or reinjections given in the 4 sectors in 1946, 1947, 1948 and 1949 were 261 ; 4,429 ; 41,565 ; and 80,751 ; respectively.

Injections were repeated at intervals of 6 months, as many as 5 having been given in two of the districts. Results, which the authors describe as remarkable, have been as follows in 7 districts of the 4 treated sectors (the actual numbers of people treated in each district are not quoted by the authors) :—

No. of " chemoprophylaxis campaigns "	Parasite index	
	Before treatment	After the latest treatment
4	2·68	0·02
2 to 4	2·70	0·09
3	8·9	1·3
1	1·45	0·72
2	3·3	0·71
5	4	0·5
5	14	0·07

[In the above table, " Parasite Index " is used to translate the French " Indice de Virus en Circulation ", as in the official English text of the conclusions of the International Trypanosomiasis Conference at Brazzaville in February, 1948 [see this *Bulletin*, 1948, v. 45, 770]. The Index is derived as follows :—

$$\frac{\text{New cases for the year, plus old cases still showing trypanosomes, whether peripherally or in the cerebrospinal fluid}}{\text{Total population examined}} \times 100$$

Mass prophylaxis by the diamidines is rapidly acquiring a high reputation, particularly in French and Belgian territories. It is therefore disconcerting to gather from the present report that parasite indices as high as 1·3 and 0·5 can be found after prophylactic treatments repeated 3 and 5 times, respectively, at intervals of 6 months. The good name of this method of controlling sleeping sickness seems to require some attempt at explaining why better results were not achieved by such persistent efforts in those particular localities.]

E. M. Lourie

Raynal, J. H. & Lotte, A. J. Les premières campagnes de Lomidinisation dans la protection des populations rurales de l'Afrique Equatoriale Française contre la maladie du sommeil. [**Lomidine (Pentamidine) for Mass Chemoprophylaxis against Sleeping Sickness in French Equatorial Africa.**] *Rev. Coloniale de Méd. et Chir.* 1951, Jan. 15, v. 23, No. 186, 6–10.

This general survey of the history of chemoprophylaxis against sleeping sickness by lomidine or pentamidine in French Equatorial Africa adds little to what has already been written on the subject [Saleun & Chassain, this

Bulletin, 1948, v. 45, 875 ; KERNEVEZ & CHASSAIN, this *Bulletin*, 1950, v. 47, 825 ; KERNEVEZ & CHASSAIN, above. The last-mentioned report brought the story up to the end of 1949.

From January 1950 it is planned to apply the technique of prophylactic " lomidinization " to all regions or villages of French Equatorial Africa where the parasite index is more than 1·0 per cent. The localities where the procedure has already been applied, together with relevant figures, are given. At the time of writing, the population protected totalled between 150,000 and 200,000, involving 300,000 injections. In those districts where the injections have been repeated 4 or 5 times at intervals of 6 months the new infection rate has been reduced by 90 to 95 per cent., and these good results have " galvanized the ardour " of those concerned in the campaign against the disease.

E. M. Lourie

SCAILLET, L. & HADDAD, E. La trypanosomiase dans le secteur des cataractes. Considérations après dix-huit mois de chimio-prophylaxie à la pentamidine. [**Trypanosomiasis in the Cataracts Sector, Belgian Congo. Findings after Eighteen Months of Chemoprophylaxis by Pentamidine.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1525–39.

Between February and September, 1948, 19,909 people in the Cataracts Sector of the Belgian Congo received a prophylactic injection of pentamidine [SCAILLET & HADDAD, this *Bulletin*, 1950, v. 47, p. 453]. From September 1948 to June 1949, 20 more villages comprising 2,800 inhabitants were brought into the scheme of operations. All the treated areas were revisited at intervals of 6 months, when everybody was examined and a further prophylactic dose given to as many as possible of those found still to be uninfected. There have so far been 3 such re-examinations and re-treatments.

The overall new infection rate in the treated villages at the start of the campaign was 3·2 per cent. among 23,491 people. The number then treated amounted to 22,726. In the course of the next 18 months in 47,644 examinations of people treated or re-treated 6 months earlier there were 72 new cases, giving a new infection rate of 0·15 per cent. That the reservoir of infection was gradually reduced was suggested by the fact that among those not treated, or treated a year or more before the examination, the new infection rates in consecutive 6-month periods were 3·2, 1·8, 1·6 and 1·2 per cent.

Of the 72 new cases found among those who were injected or re-injected 6 months earlier, 17 were in the nervous stage and were therefore assumed to have been already infected but not diagnosed at the time of the " prophylactic " injection. The danger of cryptic infections arising as a result of chemoprophylaxis is once again illustrated by the fact that 22 of these 72 patients were diagnosed only on clinical grounds, without trypanosomes being found. It was estimated that about 5 per cent. of infected people failed to be diagnosed during the routine examinations at the time of the prophylactic treatments.

Among 10,646 people who had been treated on 3 occasions, only 6 were later detected in the lymphatico-blood stage of infection, *i.e.*, a new infection rate of only 0·06 per cent.

E. M. Lourie

ORMEROD, W. E. **The Mode of Action of Antrycide.** *Brit. J. Pharmacol. & Chemotherapy*. 1951, June, v. 6, No. 2, 325–33, 4 pls.

Although the particular virtue of antrycide is its activity against *T. congolense*, most of the observations of this paper have been made on *T. equiperdum*. There are quantitative differences between the susceptibilities of these species

to the drug, but there is no reason to believe that the differences are of a qualitative nature.

Trypanosomes were suspended *in vitro* in varying concentrations of antrycide in a medium consisting of diluted horse serum, the technique being adapted from that of YORKE *et al.* [this *Bulletin*, 1930, v. 27, 237]. After periods of incubation ranging up to 20 hours at 37°C., trypanocidal activity as judged by microscope-examination was of a very low order. Sometimes a concentration of 1 /80,000 antrycide methylsulphate killed a proportion of trypanosomes ; lower concentrations were inactive. These lower concentrations, down to 1 /640,000, did, however, impair the trypanosomes' infectivity, and this was demonstrable even after washing them free of the antrycide solution. No differences were observed in these respects between the normal trypanosome strain and one that had been made resistant to antrycide *in vivo*. The serum of a rat 24 hours after an effective dose of antrycide was inactive against trypanosomes *in vitro*. No inhibition of respiration or glucose utilization by normal or resistant trypanosomes was observed by the Warburg technique at concentrations below 1 /40,000.

When mice are treated with an effective dose of antrycide at the beginning of an infection the trypanosomes may nevertheless continue to multiply in the blood, reaching a peak in 24 to 48 hours and disappearing only after 2 to 4 days. Their infectivity is, however, considerably reduced within an hour of the treatment and is abolished 24 hours later.

The relative number of dividing forms of the trypanosome in the blood of a treated animal begins to decrease 24 hours after the treatment, and multinuclear forms are sometimes seen. Another striking finding is the appearance, in a proportion of the trypanosomes at about the same time, of deeply staining basophilic inclusion bodies in the cytoplasm in groups or large masses, often cramming and obliterating other features of internal structure. These were produced in *T. congolense* and in *T. rhodesiense* as well as in *T. equiperdum*. In a strain completely resistant to antrycide no inclusion bodies were produced. The bodies were not usually visible in unstained films except under phase contrast microscopy, when they could be seen as highly refractile granules in living and actively moving trypanosomes. They could also be seen in dried unfixed preparations under the fluorescence microscope. The appearances encountered are fully described and illustrated.

The author interprets his evidence as showing that (*a*) antrycide penetrates slowly into the cell and exerts its action in the cell and not on the surface membrane ; (*b*) the action is on the cytoplasm and not primarily on the nucleus, and (*c*) it acts as a growth inhibitor and not as a direct " trypanocide."

E. M. Lourie

ORMEROD, W. E. **A Study of Basophilic Inclusion Bodies produced by Chemotherapeutic Agents in Trypanosomes.** *Brit. J. Pharmacol. & Chemotherapy.* 1951, June, v. 6, No. 2, 334–41. [22 refs.]

In the paper above, the author described the formation of basophilic inclusion bodies in trypanosomes as an effect of treatment by antrycide methylsulphate. Dimidium bromide and suramin also produced similar well-marked inclusion bodies, but tryparsamide and stilbamidine did not, and acriflavine caused degenerative changes which obscured any possible evidence of such changes.

Similar inclusion bodies can be produced *in vitro* by basic dyes containing primary, secondary or tertiary amine groups, especially by neutral red or toluidine blue. No acid or quaternary amine dye was found capable of staining living trypanosomes. The " volutin " granules described by other workers may perhaps be of the same general nature, and may result from an unspecific

reaction of the trypanosome to non-trypanocidal basic substances circulating in the blood. Cytochemical studies of the inclusion bodies produced by antrycide showed that they contain ribonucleic acid and protein.

The author's previous paper provided evidence for the view that antrycide inhibits the growth of trypanosomes and that it enters the cell and is concentrated in the inclusion bodies. Observations by Lock [this *Bulletin*, 1951, v. 48, 344] on dimidium bromide, and by Hawking [this *Bulletin*, 1939, v. 36, 742] and V. Jancsó & V. Jancsó [this *Bulletin*, 1935, v. 32, 22] on suramin suggested that these compounds act against trypanosomes in the same way as antrycide, and the present work strengthens this evidence. Caspersson (1950, *Cell Growth and Cell Function*, New York ; Norton) has emphasized that the interaction of protein and ribonucleic acid in the cytoplasm is an essential point of protein synthesis, cell growth and reproduction. In the drug-treated trypanosome, therefore, growth and reproduction would cease when an appreciable amount of the protein or ribonucleic acid is inactivated, as it would be by being removed from the cytoplasm phase to that of the inclusion body. The fundamental difference between the inclusion bodies produced by these drugs and those produced by vital stains is that the former are irreversible, while the latter are reversible, that is to say, on washing the trypanosomes free of the vital stain by centrifugation they resume their normal appearance. This difference between inclusion bodies produced by these two types of compound is to be explained by the facts that antrycide, dimidium bromide and suramin possess fixed electric charges which, once the drugs have penetrated the cell membrane, tend to retain them in the trypanosome, preventing its growth and division ; the charged forms of the vital stains, on the other hand, are in equilibrium at *p*H 7·5 with uncharged forms which can diffuse rapidly out of the trypanosome cell.

Although no inclusion bodies were found in trypanosomes treated with stilbamidine, reasons are given for believing that this drug does, in fact, act by the same mechanism as antrycide, dimidium and suramin.

[This is a valuable and stimulating contribution, worthy of careful study in the original.] *E. M. Lourie*

Fiennes, R. N. T.-W. **Antrycide and Dimidium.** [Correspondence.] *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 605–8.

In the author's experience dimidium bromide is more active than antrycide against *T. congolense*, but not against *T. vivax*, in cattle. A dose of 1·0 mgm. per kgm. of dimidium subcutaneously cured all of 7 cattle and 0·5 mgm. cured 20 out of 33 infected with *T. congolense*. At the recommended doses of 5 mgm. per kgm. antrycide and 1·2 to 1·5 mgm. dimidium the latter drug has the important advantage of lower cost where large numbers of native stock are concerned, but antrycide has important properties which in many ways make it the best trypanocide yet produced. Among these are that it is active against all the trypanosomes of domestic stock in Africa, including *T. vivax*, which so often co-exists with *T. congolense* in an infected herd. Its higher solubility than that of dimidium also makes it easier to use.

The field treatment of trypanosomiasis in domestic animals is a more complex matter than some workers imagine from their experiments with mice. Among the complicating factors are that what the author calls " early primary " or " acute primary trypanosomiasis " can be cured by a variety of remedies, but chronic infection, which he describes as " secondary trypanosomiasis ", is much more refractory. " Secondary trypanosomiasis " may arise either naturally or as a result of unsuccessful treatment or drug prophylaxis, and sub-inoculation tests have shown that its refractory nature is not dependent

on drug fastness. Relapses in treated cattle may not occur until more than 12 months have elapsed, and there is always the danger that relapse trypanosomes may be drug-resistant. In "secondary trypanosomiasis" symptoms and lesions, and even death, may occur without trypanosomes being present in the peripheral blood. In some such cases the author has in fact demonstrated parasitic involvement of the cardiac muscle associated with severe heart lesions.

Experiments are described which tend to show that the activation of a virus affecting mainly the liver may have been the true cause of the toxic effects if dimidium treatment which have in the past been attributed to photosensiotzation. *E. M. Lourie*

TOBBACK, L. Experimentación del Antrycide en el Congo Belga. [**Trials With Antrycide in the Belgian Congo.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 315–29.

VAYSSE, J. & ZOTTNER, G. Contribución al estudio de la quimioterapia y de quimioprevención de la durina por el Antrycide. [**Chemotherapy and Prophylaxis of Dourine with Antrycide.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 330–36.

PETERS, L. & WRIGHT, H. N. **Trypanocidal Activity and Arsenic Content of Rat Blood following Intravenous Administration of Oxophenarsine Hydrochloride.** *J. Pharmacol. & Exper. Therap.* 1951, Mar., v. 101, No. 3, 268–74. [17 refs.]

Previous work has indicated that when rats are injected intravenously with oxophenarsine (the same as Mapharside or Mapharsen) the blood, withdrawn and examined at intervals afterwards, can be shown to lose its *in vitro* trypanocidal activity much more rapidly than its arsenic content. This has now been subjected to closer study.

The dose injected was 12·5 mgm. per kgm. A difference between the rate of disappearance of *in vitro* trypanocidal activity and of arsenic content was first observed 4 hours after the injection, and 8 hours later the arsenic still present in the blood had only 1 per cent. of the activity it would have had if there had been no deterioration of its trypanocidal property. The partition of blood arsenic between cells and plasma in the injected animal was much in favour of the cells, but the loss of trypanocidal activity of the blood arsenic did not parallel the loss of arsenic from the plasma fraction. Some loss of activity could be shown when the drug was incubated with rat blood *in vitro* at 37°C., but this proceeded at a considerably slower rate than that observed *in vivo*. These facts point towards an extravascular site for the process of inactivation of the oxophenarsine. The actual site and the mechanism are matters for speculation. There is evidence that the site of inactivation when the drug is incubated in blood *in vitro* is the blood cells, from which inactive arsenic may be returned into the plasma. *E. M. Lourie*

VON BRAND, T., TOBIE, Eleanor J. & MEHLMAN, B. **The Failure of Cortisone and ACTH to influence Gluconeogenesis during Trypanosomiasis of the Fasting Rat.** *Amer. J. Hyg.* 1951, July, v. 54, No. 1, 76–81, 1 fig.

"1. Neither cortisone nor ACTH have a detectable influence on trypanosomes in vitro nor do they change the rate of development of the parasites in vivo, or the survival of infected rats.

" 2. Gluconeogenesis as demonstrable in starving rats under the influence of cortisone is impaired on the third day of infection and completely lacking on the fourth day. It is obvious that a metabolic disturbance of the rats, and not an increased sugar consumption of the parasites, is responsible."

See also p. 971, BOLLIGER & MACINDOE, **Eye Changes in a Marsupial experimentally infected with Kala-Azar and Trypanosomiasis.**

MUNIZ, J. & DOS SANTOS, Mireille C. F. **Heterophile Antibodies in American Trypanosomiasis. The Presence of Heterogenetic Component(s) in the Antigenic Structure of the *Schizotrypanum cruzi* shown by " Conditioned Hemolysis " Reaction.** *Hospital.* Rio de Janeiro. 1950, Oct., v. 38, No. 4, 601–16.

It was noted by MUNIZ & DE FREITAS [this *Bulletin*, 1945, v. 42, 975] that the serum of certain persons who had never suffered from Chagas's disease contained agglutinins for *Trypanosoma cruzi*, and HENDERSON-BEGG [this *Bulletin*, 1947, v. 44, 509] reported the presence of heterophile antibodies for sheep red cells in the blood of cases of trypanosomiasis in West Africa. The present communication describes investigations of the heterophile agglutinins and haemolysins for sheep red cells found in patients suffering from South American trypanosomiasis. The agglutination titre was determined against a 0·5 per cent. suspension of sheep red cells ; the mixtures of cells and inactivated serum were incubated at 37°C. for 1 hour and then allowed to stand at room temperature for 24 hours before the reading was made. The haemolytic titre was estimated with the same red cell suspension, in the presence of an excess of guineapig complement which had been previously absorbed with sheep red cells to remove any natural sensitizing antibodies.

In the table are set out the distribution of the heterophile titres in the sera of 15 acute and 50 chronic cases of Chagas's disease. The haemolytic tends to be rather higher than the agglutinin titre and, as is to be expected, acute cases provide the more potent sera. In further tests the haemolytic titre was found as a rule to be the same as the specific agglutinin titre for cultural forms of *T. cruzi*.

In a series of experiments, designed to investigate the relationships of the heterophile antibody, sera were absorbed either with beef red cells, an emulsion of guineapig kidney, or a suspension of cultural forms of *T. cruzi*. The agglutination titres against suspensions of *T. cruzi*, and sheep red cells, and the haemolytic titres, were then determined for the absorbed sera. It was found that :—

(1) Absorption with *T. cruzi* removed the homologous agglutinins, but left practically untouched the agglutinins and haemolysins for sheep red cells.

(2) Absorption with beef red cells reduced to some extent the agglutinin and haemolysin titres for sheep red cells, but had no effect on the homologous agglutinins for *T. cruzi*.

(3) Absorption with guineapig kidney completely removed the heterophile antibody, but left the homologous agglutinins unaltered.

Antisera, prepared by the inoculation of rabbits with cultural forms of *T. cruzi*, contained haemolytic antibodies but not agglutinins for sheep red cells. These heterophile haemolysins also were removed by absorption with guineapig kidney, but were unaffected by beef red cells.

Experiments were also made with sera from one normal person, and from 2 cases of schistosomiasis, all of which contained haemolysins for sheep red cells. These sera had also the power to haemolyse human or sheep red cells which had been " sensitized " with the polysaccharide fraction of *T. cruzi*

[for details of this test see below]. These lysins could be absorbed by guineapig kidney tissue from the 2 schistosomiasis sera ; this treatment only reduced the titre slightly in the serum of the normal subject, but normal sheep red cells completely absorbed the antibody.

From these results it appears that this heterophile antibody differs from that present in African sleeping sickness which was found by Henderson-Begg to be largely but not completely absorbed by both beef red cells and guineapig kidney.

Since these heterophile antibodies can react with Forssman antigens in complement-fixation tests, their presence constitutes a potential source of error if antigens for the diagnosis of certain parasitic infections are prepared from guineapigs or similar animals.

Distribution of Agglutinin and Haemolysin Titres for Sheep Red Cells in Sera of 15 Acute and 50 Chronic Cases of American Trypanosomiasis.

	Agglutination Titre.								
	1/20	1/40	1/80	1/160	1/320	1/640	1/1280	1/2560	1/5120
Acute Cases	—	—	—	—	—	5	6	4	—
Chronic Cases	2	2	6	18	17	5	—	—	—

	Haemolysin Titre								
	1/20	1/40	1/80	1/160	1/320	1/640	1/1280	1/2560	1/5120
Acute Cases	—	—	—	—	—	1	4	6	4
Chronic Cases	1	2	2	4	14	21	6	—	—

J. C. Broom

MUNIZ, J. & DOS SANTOS, Mireille C. F. **Technic of " Conditioned Hemolysis " applied in the Diagnosis of American Trypanosomiasis.** *Hospital.* Rio de Janeiro. 1950, Oct., v. 38, No. 4, 617–20.

This test was developed to avoid the errors in diagnosis of Chagas's disease which could arise from the presence in *Trypanosoma cruzi* of an antigen which reacts with the heterophile antibodies which may be found in uninfected persons. Before the test is carried out, the serum under investigation is inactivated, and absorbed first with guineapig kidney, and then with normal sheep cells, to remove all heterophile antibody. In the same way, the guineapig complement is twice absorbed with normal red cells of the animal which provides the cells to be " sensitized ".

To prepare the polysaccharide fraction used for sensitization, the parasites from 6- to 8-day cultures of *T. cruzi* are filtered through cotton, and washed with normal saline in the centrifuge. To 0·5 ml. of the deposit is added 1·0 to 1·5 ml. of formamide ; the suspension is shaken, and then heated for 10 to 15 minutes in a glycerin bath at 150°C. After cooling, 5 ml. of a mixture containing 95 parts of alcohol and 5 parts of 2N.HCl are added, and the mixture is thoroughly shaken for 15 to 20 minutes. The insoluble fraction is removed by centrifugation, and 10 ml. of pure acetone are added to the supernatant fluid. This precipitates the active fraction, which is separated and

dried. From 2 to 3 ml. of saline are next added, and the reaction adjusted to *p*H 6·8–7 with sodium bicarbonate solution. Any insoluble material is removed, and the solution is left overnight at 5°C., after which the supernatant is separated from any further precipitate which may have formed. A precipitin test is carried out with specific antiserum to ensure the activity of the supernatant fluid.

For sensitization, red cells from a sheep, or the patient, are washed 4 times with saline, then 2 ml. of polysaccharide solution are added to 0·5 ml. of packed cells. The mixture is incubated for 2 hours at 37°C., and is shaken at intervals to keep the cells in suspension. The cells are then washed 3 times with saline, and finally made up to a 0·5 per cent. suspension. The sensitized cells should be used within 24 hours of preparation.

In carrying out the test, 0·5 ml. quantities of serial dilutions of serum are mixed with 0·5 ml. of sensitized cells and 0·05 to 0·1 ml. of complement, and the suspension is incubated at 37°C. Readings are made after 1 and 2 hours, the highest dilution of serum which produces haemolysis being taken as the titre.

This reaction differs from normal serological haemolysis in that the specificity is determined by the adsorbed polysaccharide, and not by the cells. The term "conditioned haemolysis" is therefore used to designate this phenomenon.

J. C. Broom

Muniz, J. **On the Value of "Conditioned Hemolysis" for the Diagnosis of American Trypanosomiasis. A Comparative Study with Complement Fixation and Sensitized Erythrocytes Agglutination Tests.** *Hospital.* Rio de Janeiro. 1950, Nov., v. 38, No. 5, 685–91, 1 graph.

Sera from 10 human cases of Chagas's disease were used to compare the relative values of complement-fixation reactions, conditioned haemolysis, and the agglutination of sensitized red cells for the diagnosis of American trypanosomiasis. Cultural forms of *Trypanosoma cruzi*, dried by the lyophile process and resuspended in saline just before use, provided the antigen in the complement-fixation tests. Red blood cells, sensitized with the polysaccharide fraction of *T. cruzi* in the manner described above, were used in both the other tests. As before, special emphasis is laid on the need for the preliminary absorption of both the complement, and the sera under investigation, to exclude non-specific effects.

All 10 sera reacted positively in each test. The titres of individual sera obtained by the different techniques varied from one another, but the highest was always given by the method of conditioned haemolysis. The author considers that this test should prove of value for diagnostic purposes, and suggests that further work may lead to purification of the polysaccharide fraction. If it proved possible to remove the components which react with heterophile antibodies without reducing the sensitivity of the reaction, the preliminary absorption would no longer be necessary, and the test would be greatly simplified.

J. C. Broom

Villela, E. de A. Moléstia de Chagas. Algumas aquisições recentes, em especial relativas à profilaxia. [**Chagas's Disease. Recent Advances in Knowledge and, in particular, in Prophylaxis.**] *Rev. Brasileira Malariologia.* Rio de Janeiro. 1951, Jan. 15, v. 3, No. 1, 101–21, 5 figs. (4 on pls.) [39 refs.] English summary.

This is a Congress paper dealing generally with the subject of Chagas's disease and contains a number of quotations from and references to the

literature. Reference is made to the distribution of the disease, to its vectors and certain epidemiological features and the pathology of the myocarditis and of *mal de engasgo* [see this *Bulletin*, 1921, v. 18, 301 ; 1927, v. 24, 830 ; 1931, v. 28, 53 ; 1934, v. 31, 347] or mega-oesophagus, and whether the latter is due to, or merely a condition coincidental with, Chagas's disease.

As regards the special point mentioned in the title—recent advances in prophylaxis—the author refers to elimination of animals infected, especially dogs, as reservoirs of infection, attacks on the transmitting insects by improvement in the construction of dwellings and by educational propaganda and by destruction of the transmitter as by Fly-tox and Radiotox. The latter, a thiophosphate, is very efficacious but is toxic to man, so the operator has to be provided with special protective clothing. *H. Harold Scott*

GALLIARD, H. & BOUTET, R. Effets de la chimiothérapie de l'infection à *Trypanosoma cruzi* Chagas chez les Réduvidés hématophages. [**Effects of Chemotherapy on *T. cruzi* Infections in Reduviid Bugs.**] *C. R. Soc. Biol.* 1951, Feb., v. 145, Nos. 3/4, 304–7.

The object of these experiments was to find out whether it is possible to eliminate or prevent *T. cruzi* infection of the alimentary tract of reduviid bugs (*Rhodnius prolixus* and *Triatoma infestans*) by feeding them on animals treated with drugs such as Bayer 7602, which are known to have a chemotherapeutic effect on the vertebrate infection. Four types of experiment were performed, as follows :—

(1) The bugs, presenting metacyclic forms in the dejecta, were fed on uninfected mice that had been treated by lomidine (*i.e.*, pentamidine) or by Bayer 7602. This resulted only in a slight and temporary diminution in the number of parasites excreted.

(2) Bugs were first fed on uninfected mice that had received a massive drug dose and then on infected mice. The effect of Bayer 7602 and of nivaquine was to produce a temporary intensification of infection in the bugs. After lomidine all the bugs died.

(3) The parasitized faeces from bugs of the experiments of series 1 above were inoculated, at various times, into fresh mice. Normal infections resulted.

(4) The parasitized faeces from bugs of the experiments of series 2 above were likewise inoculated, at various times, into fresh mice. When the inoculations were done at the time of intensification of faecal infection, remarkably heavy mouse infections resulted. Subinoculations from these mouse infections, however, produced normal infections. When the faecal inoculations were done after the heavy infestation of the faeces had subsided, the resulting mouse infections ran a normal course.

The question is asked why such heavy mouse infections were produced in the experiments of series 4. An association between this result and toxicity of the drug for either the mouse or the bug is made less likely by the fact that lomidine proved to be the most toxic for both mouse and bug, and yet it was after this drug that intensification of the mouse infection was least in evidence. A large number of organisms inoculated with the infected excreta may also be ruled out in explanation of the intensified mouse infections, because the inoculation of equally numerous parasites derived from the blood infections gave rise to the usual low grade of infection. *E. M. Lourie*

LEISHMANIASIS

KOSTICH, D. Y. **Source Determination of Blood Meal in Sandflies (Phlebotominae) in Yugoslavia (Dobricky County). 2,760 Haemoprecipitin Tests.** *Acta Tropica.* Basle. 1951, v. 8, No. 2, 131–5. [12 refs.]

At Nish, in the centre of Serbia, kala azar in children is not rare. The children's hospital saw 42 cases in 1948 and 17 in 1949 (ages 3 months to 13 years). In a wide survey in the neighbourhood other cases were found.

Accepting the view that transmission was probably by *Phlebotomus*, the author wished to know which species feeds on man. He found that among 230 gorged sandflies caught in houses, 84 per cent. were *P. papatasi* ; in other shelters the figure was 35 per cent. among 224. On the other hand *P. perfiliewi* was actually commoner than *papatasi* in the other shelters : small numbers of *chinensis* and *major* were taken in both types of resting place.

The blood in these sandflies was examined by a precipitin test, performed by the ring method in 3 mm. tubes. The technique is described. Antisera were made against man, ox, horses, pig, dog and sheep, use being made of the methods described by PROOM, *J. Path. & Bact.*, 1943, v. 55, 419.

The precipitin tests showed that none of the species of *Phlebotomus* is specific in choice of food. Of 193 *P. papatasi* taken in houses, 63 per cent. had fed on man, 12 per cent. on ox, a few on horse, sheep, pig, dog : among 78 individuals of this species caught in other places the percentage fed on man was lower (42 per cent.), and the other rates correspondingly higher, ox again coming second (20 per cent.), *P. perfiliewi* fed to a considerable extent on man, dog coming second. Several individuals of each species gave a positive reaction for two mammal species, indeed one *papatasi* was positive for man, horse and pig. *P. A. Buxton*

GERMAIN, A. & MARTY, J. Kala-azar traité par le 2168 RP (Glucantime). Résultats cliniques et biologiques. [**Kala Azar Treated by Glucantime (R.P.2168).**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 3/4, 240–42.

A male European, aged 32, from Tonking had suffered periodically for two years from irregular fever which was quinine-resistant. The diagnosis of kala azar was made by spleen puncture. He suffered from loss of weight, anaemia, epistaxis, oedema of the face, and enlargement of liver and spleen. The albumin/globulin ratio was reversed and the serum tests were positive.

Treatment was instituted with Anthiomaline on alternate days ; the dosage was 1, 2 and then 4 ml. for a total of 15 injections. There was only slight improvement. The Anthiomaline was now replaced by Glucantime given each day, in initial dose of 2·5 ml., followed by 5 ml., for a total of 15 intramuscular injections. There was a gain in weight of 6·5 kgm., the spleen could not be felt and the blood count had improved, but the serum tests were still positive. A second course of 15 injections of Glucantime was given ; there was further clinical improvement but the albumin/globulin ratio was still reversed and the serum tests were positive.

He maintained good health during active service for two years ; after 18 months the serum tests were negative and the albumin/globulin ratio was 2·36.

At no time was any intolerance to the drug observed. *L. E. Napier*

ANSARI, N., MOFIDI, C. & CHAFA. Effect thérapeutique de l'antimoniate de N. méthyl-glucamine dans la leishmaniose cutanée de l'homme. [**The Therapeutic Effect of the Antimoniate of N-methyl-glucamine in Cutaneous Leishmaniasis in Man.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 549–52, 2 figs.

N-methyl-glucamine antimoniate or Glucantime (R.P. 2168) has previously been used in the treatment of cutaneous leishmaniasis. Four more cases are now reported.

The first case was a child of 7 years, weighing 20 kgm., who had an oriental sore on the lip. Daily injections of 5 ml. of a solution of R.P. 2168 were given ; every other day 0·5 ml. of this was given into the lesion and the remainder intramuscularly, and on the intermediate day the whole dose was given intramuscularly. Two courses of 12 injections each with an interval of 17 days were given, that is a total of 22·5 gm. or 1·125 gm. per kgm. body-weight. At the end of the course of treatment a small nodule was still present but no leishmaniae could be found in it. Fifteen days later this nodule had disappeared, and there was only slight discoloration with no inflammation.

The second case was a man aged 28, weight 60 kgm., who had had an oriental sore on the back of the hand for three months and had been treated unsuccessfully with several forms of injections, including emetine. He received 15 injections of 10 ml. daily, of which 0·2 ml. was given into the lesion on alternate days and the rest intramuscularly, a total of 45 gm. or 0·75 gm. per kgm. body-weight.

The third case was a child of 13 years, 30 kgm., who had two oriental sores, one on the forehead and one on the bridge of the nose ; she was given 15 injections of 10 ml., of which 0·5 ml. and 0·2 ml. were given into the lesions, respectively, on alternate days, and the remainder intramuscularly.

The fourth case was a child of one year, with button-like lesions on each lower lid. In this case the injections were all given intramuscularly. He received a total of 21 gm. of R.P. 2168, or 2 grammes per kgm. body-weight.

In all these cases leishmaniae were found before treatment in smears and confirmed by culture, whereas after treatment degenerate leishmaniae were seen, but were shown to be non-viable. The lesions disappeared leaving no more than slight discoloration of the skin.

It is concluded that R.P. 2168 is as efficacious as any other medicament used in the treatment of oriental sore, and that it will effect a cure in total doses of 1–2 gm. per kgm. without causing toxic manifestations.

L. E. Napier

Claisse, R., di Matteo, J., Deuil, R. & de Traverse, P. M. Diabète aigu après kala-azar traité par la diamidine. [**Acute Diabetes after Kala Azar treated by Diamidines.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1950, Nos. 3/4, 153–9.

The authors report a case of kala azar in which the infection was apparently acquired in the neighbourhood of Paris, and in which an acute attack of diabetes developed during convalescence after treatment by diamidines.

The patient was a female aged 30 years who had a febrile attack with shivering, diarrhoea and leucopenia ; a diagnosis of paratyphoid was made on the strength of a feebly positive Widal reaction. A second febrile attack occurred after an apyrexical period of two months ; during this attack an enlarged spleen and liver and anaemia were observed. The fever again subsided but relapsed after about 10 days and a third attack occurred in which all the signs and symptoms were aggravated ; at this point the possibility of a parasitic infection was envisaged. A spleen puncture revealed numerous leishmaniae, although the bone punctures were negative. There was a reversal of the albumin/globulin ratio. During each febrile attack the urine was found to be normal.

Treatment was commenced with Lomidine (the M-dimethanesulphonate of 4 : 1′ : [? 4 : 4′] diamidino-diphenoxypentane). The initial dose of 0·125 gm. was increased to a maximum of 0·25 gm. given intramuscularly on alternate days, a total of 3·68 gm. There were no signs of intolerance. A second series of injections to a total of 3 gm., making a grand total of 6·68 gm., was given. All the signs and symptoms of kala azar subsided.

Twenty-four days after the last injection, when the patient was convalescing in the country, she developed visual trouble and excessive thirst, and returned to Paris.

She was admitted to hospital in a state of " pre-coma " and was found to have a glycaemia of 4·48 gm. and glycosuria of 62 gm. per 1,000 ml. The acute condition subsided under insulin treatment, and after about a month the glycosuria had disappeared and the glycaemia had fallen to 1·61 gm. A daily maintenance dose of 10 units of " I.P.Z." was prescribed. After another month this was discontinued, but a low carbohydrate diet was prescribed. After six months the patient's glycaemia was below 1 gm.

It was thought that the infection might have been acquired when the patient attended a scout jamboree, at which North Africans and Indians were also present, ten months before the onset of symptoms.

In a discussion on the cause of the diabetes the probabilities of its being caused by the infection, or by the toxic effects of the drug, were weighed. It was concluded that the latter was the more probable and that the attack was precipitated by a sudden release of the drug from its intramuscular depots, but that there must have been a predisposition to the disease. [For the action of lomidine on the blood sugar see this *Bulletin*, 1949, v. 46, 918.]

L. E. Napier

CHANG, Nai-chu & LIU, Feng-ting. **Failure of Aureomycin in Treatment of Experimental Leishmaniasis.** *Proc. Soc. Exper. Biol. & Med.* 1951, June, v. 77, No. 2, 299–300.

In this study, aureomycin was given to groups of Chinese hamsters which had been infected intraperitoneally with saline suspensions of spleens containing many leishmaniae.

One group of hamsters received the aureomycin intraperitoneally twice daily for 5 days, a second for 10 days. In the first group treatment began immediately after the injection of leishmaniae, in the second it was delayed for 2 months after infection.

Each group was further divided into three lots of 20 animals, which received respectively (1) 3 mgm. aureomycin, (2) 1·5 mgm. aureomycin and (3) 0·5 ml. normal saline, per animal each day. The hamsters weighed 20 to 30 gm. each.

Eighteen animals died, apparently of drug intoxication. The survivors were killed 2 months after completion of treatment. All these animals had enlarged spleens and were heavily infected with Leishman-Donovan bodies.

It is concluded that aureomycin in doses up to 100–150 mgm. per kgm. daily was without beneficial effect in experimental leishmaniasis in Chinese hamsters.

H. J. O'D. Burke-Gaffney

BOLLIGER, A. & MACINDOE, N. M. **Eye Changes in a Marsupial experimentally infected with Kala-Azar and Trypanosomiasis.** *Amer. J. Ophthalm.* 1950, Dec., v. 33, No. 12, 1871–7, 12 figs.

" Kala-azar transmitted to a marsupial, the common phalanger or possum (Trichosurus vulpecula), produces a chronic progressive disease associated with severe eye lesions.

" The observed ocular changes, such as interstitial keratitis, uveitis, retinitis, and optic neuritis, resemble those seen in man in internal diseases and particularly syphilis.

" In addition, progressive cataracts mainly of the posterior polar type were observed in the great majority of the affected eyes.

"South American trypanosomiasis (Chagas's disease) transmitted to the phalanger produces an acute disease with a recovery rate of 40 percent. Eye lesions, seen in the late acute and recovery stages, differ somewhat from those seen in experimental kala-azar."

MARTINEZ, E. Leishmaniasis en Yucatán. [**Leishmaniasis in Yucatán.**] *Rev. Méd. Yucatán.* 1951, June 30, v. 26, No. 5, 294–6.

Remarks on this infection in Yucatán, are mostly of a general character. The vector was originally thought to be the chicle fly, but later investigations have incriminated *Hippobosca* and species of *Phlebotomus*. The symptomatology is described, the pruriginous papule becoming vesicular, bursting, crusting over and slowly extending as a painful ulcer.

The initial localization of 358 cases is given : 143 (39·9 per cent.) were on the pinna of the ear, 65 (18·1) on nose or lips, 35 (9·7) on the forearm. Forms of treatment by Fouadin, neoarsphenamine, and atebrin are mentioned, but nothing is said regarding dosage. Several who did not respond to these treatments and 60 others were treated as follows : the ulcer and the parts around it were cleaned with alcohol (40°), the crust was removed and the base of the ulcer treated with hydrogen peroxide and later with 10 per cent. pure HCl, taking care that it penetrated beneath the edge where the leishmaniae were hidden. Cutaneous leishmaniasis of Yucatán, says the author, differs from *bouton d'orient* in its greater tendency to localization, and the effectiveness of the treatment just described which, moreover, is economical and easy to apply. *H. Harold Scott*

ANSARI, N. & MOFIDI, C. Contribution à l'étude des "formes humides" de leishmaniose cutanée. [**A Contribution to the Study of "Moist Forms" of Cutaneous Leishmaniasis.**] *Bull. Soc. Path. Exot.* 1950, v. 43, Nos. 9/10, 601–7, 7 figs. on 4 pls.

A report was received that troops in the Russo-Iranian frontier were suffering from an unusual cutaneous eruption. Six cases were studied and leishmaniae were recovered from five of these by culture or mouse inoculation : the sixth was clinically identical.

The lesions were widely distributed, being on the face, neck, trunk, loin, elbow, thighs, legs and feet, and of a variety of forms ; in one patient, papules, tubercles, lymphatic nodules, and deep ulcerations were observed. Others were non-ulcerating plaques, lupus-like forms, and a variety of ulcerating lesions, including framboesiform and fungating lesions. After healing in the centre they may continue to extend from the edges. Others extend along the lymphatics and yet others without obvious relation to the primary lesion appear in distant parts of the body.

The incubation period in this form of leishmaniasis may be as short as 10 days.

The lesion starts with a papule surrounded by an area of oedema and erythema. The centre becomes thin and shiny and breaks down very rapidly—within a few days—in comparison with the classical oriental sore. There is infection of the surrounding lymphatics, along which nodules of various sizes from that of a small pea to a large nut appear. Occasionally a limb will develop a truly elephantoid appearance.

In the lymphatic glands there is an intense cellular reaction in which there are macrophages, lymphocytes, plasma cells and histiocytes, and, if there is secondary infection, polymorphonuclears. In the classical oriental sore there

appears to be a host-cell-parasite tolerance, but in these lesions the macrophages appear to be actively destroying the parasites, and typical leishmaniae are rare.

For culture the authors used N.N.N. medium to which 500 to 1,000 units of penicillin G and 2–5 mgm. of vitamin C had been added [per cc.]. [See this *Bulletin*, 1947, v. 44, 191.] Two strains were obtained, strain C and strain Z : the former, which was obtained directly from a patient, was sub-cultured with great difficulty, but the latter, obtained from a mouse that had been inoculated with material from a patient, was easily passaged.

Guineapigs, rabbits, rats and mice were used in inoculation experiments, but only in mice were positive results obtained.

Serum reactions were carried out with these two strains and with a strain O obtained from a case of " dry " oriental sore. With anti-leishmania serum obtained from rabbits inoculated with strain O, immobilization of the leptomonads of strains C and Z were obtained in dilutions of 1 in 2 to 1 in 50, but this is inconclusive.

In order to show that there was cross immunity between the two forms of cutaneous leishmaniasis the authors, who had had typical oriental sores 20 and 30 years previously respectively, inoculated a living culture of strain C into their left legs. They presented simultaneously the same phenomenon, an erythematous papule, in four hours after the inoculation ; this was surrounded by an erythematous and oedematous zone and accompanied by slight fever and headache which persisted for 24 hours. After three days the inguinal glands became enlarged and painful for three days. After four days the papule broke down in the centre and by the ninth day a crust formed under which an ulcer developed ; this was surrounded by a discoloured area which eventually desquamated. Cicatrization of the ulcer occurred about the 24th day and by the 50th day only a slight scar surrounded by a brown area remained.

The authors consider that this was a typical Arthus reaction as described by Adler and Zuckerman [this *Bulletin*, 1949, v. 46, 449], which suggests that some cross-immunity exists. [For a discussion of the " moist " type of cutaneous leishmaniasis, see Hoare " Cutaneous Leishmaniasis ; a Critical Review of Recent Russian Work ", this *Bulletin*, 1944, v. 41, 331–345.]

L. E. Napier

FEVERS OF THE TYPHUS GROUP

Kitaoka, M. & Shishido, A. **Surv[iv]ing Period of Rickettsia in Feces from Lice Infected with Epidemic and Murine Typhus.** *Japanese Med. J.* 1950, Aug., v. 3, No. 4, 265–72. [12 refs.]

Dried faeces of human body lice from a typhus patient were found infective to guineapigs after storage at room temperature for 233 days. The same faeces were not infective after keeping in a refrigerator for 124 days at a temperature of 0 to 5°C. Faeces of lice artificially infected with the Wilmington strain of *R. mooseri* remained viable when kept in a dry condition at room temperature for 250 days but ceased to be viable after 393 days : the same faeces kept in a dry ice chamber at —20°C. were not viable when tested after 180 days.

John W. D. Megaw

KUMAGAI, A. **On the Acid-Turbidity-Reaction of Typhus Serum.** *Japanese Med. J.* 1950, Aug., v. 3, No. 4, 243–56, 5 figs. [21 refs.]

The principle on which the acid-turbidity test is based is that when a homologous antigen is added to the serum of a patient and the mixture is incubated for two hours a greater degree of turbidity is produced by the addition of acid than is produced in a control sample of the serum to which no antigen has been added. The turbidity is estimated by the Pulfrich photometer.

The increased turbidity can often be observed in sera taken on the 3rd day of the illness, before the Weil-Felix or complement-fixation tests have become positive. By using washed antigens of *Rickettsia mooseri* and *R. prowazeki* it was found possible to differentiate between murine and epidemic typhus as readily as with the complement-fixation test and at an earlier stage of the illness.

In patients who had been vaccinated against typhus fever the differentiation was often unsatisfactory or impossible. *John W. D. Megaw*

SCAFFIDI, Vittorio. Il tifo esantematico di genesi murina.

This book is reviewed on p. 1057.

CALIFORNIA, STATE OF. DEPT. OF PUB. HEALTH. **Typhus Fever in California, 1916-1948, Inclusive.** 99 pp., 7 graphs, 10 maps & 6 figs. [105 refs.] 1950. San Francisco : Dept. of Public Health, 760 Market Street.

This valuable monograph can be described as a report of an investigation into flea-borne typhus in California carried out by a team of workers since 1943. Among the 505 cases of fevers of the typhus group whose records were studied only 32 could be regarded as being louse-borne, and these occurred in 1916–17 among railway workers freshly imported from Mexico so that classical typhus in the State is now only of historical interest.

The contents of the paper consist of : An Epidemiological and Field Laboratory Study (26 pages) ; A Description of 100 Cases (7 pages) ; Laboratory Aids to Diagnosis (6 pages) ; Control Operations (11 pages) ; A Bibliography (3 pages with 105 references) ; A Résumé of 506 Reported Cases (32 pages in which details are given in tabular form of each case).

There are 15 tables, 7 graphs, numerous maps and 6 large figures containing detailed and illustrated specifications of everything needed for rat-proofing of buildings.

The sections dealing with field-survey and control methods contain a great deal of information which will be of special interest to workers concerned with these activities.

The clinical and epidemiological features conform to those described in previous studies of the disease in the U.S.A., but the present survey is the most comprehensive that has yet been published.

The complement-fixation test was soon found to be more convenient and more reliable than animal inoculation for detecting present and past infection among animals.

In the five counties in which the disease is known to be endemic 17·9 per cent. of the 796 animals tested were positive ; most of the animals were trapped near infected foci. In three adjacent counties none of the 129 animals tested was found positive, and in other " control " counties not known to be infected only one of the 806 animals tested was positive.

The animals giving positive reactions were :—*Rattus norvegicus* (105 among 941), *R. rattus* (7 of 101), *R. alexandrinus* (4 of 151) and *Mus musculus* (5 of 176).

None of the 51 ground squirrels tested was positive nor was any of the small number of various other animals tested.

In two family outbreaks, with five cases in each, there was reason to believe that fleas infesting kittens were the vectors.

Among 133 pools of fleas from rats 5 were infected. None of 11 pools of rat mites nor of 13 pools of rat lice was found infected.

Among 105 random samples of blood from persons recently arrived from Mexico 17·1 per cent. were positive with the complement-fixation test, but among 1,868 samples from other residents all over the State only 8 were positive and 6 of these were of Mexican origin.

From the detailed analysis of the records of 100 cases treated in hospital in the period 1924–46 it appears that a rash was seen in 93 and that six of the seven patients without a rash were Negroes. The rash was macular or maculo-papular in nearly all the patients ; there was a petechial element in twelve cases and a haemorrhagic element in five. The rash extended to the face in four cases, to the palms and soles in only one.

An " impression " of the probable diagnosis at the time of admission was recorded in 56 cases ; in only two of these the illness was suspected of being typhus ; the most frequent entries were bronchopneumonia, typhoid and enteritis, influenza, and " a cold ". No mention is made of any fatalities.

The section on laboratory aids to diagnosis contains details of the techniques of the Weil-Felix and complement-fixation tests ; the limitations of the former are said to " exclude it as an acceptable laboratory procedure wherever complement-fixation tests can be done ". Unfortunately the description of the fixation test shows that it is quite beyond the scope of most of the laboratories available to medical men in tropical countries. Animal inoculation is said to be impracticable as a routine method of diagnosis because it is time-consuming, expensive and often not satisfactory. Rickettsial agglutination does not appear to have been employed but the method is mentioned as having a conceivable prospect of becoming a real adjunct when the antigens are improved and standardized.

The section on the control of infection contains a valuable summary of modern methods of dealing with domestic rodents and their fleas.

The numerous references to the literature add greatly to the value of the publication though only nine of the 105 references are to articles more recent than 1946. *John W. D. Megaw*

GISPEN, R. & WARSA, R. **Endemic Typhus in Java. II. The Natural Infection of Rats and Rat Ectoparasites ; Identity of Shop Typhus and Murine Typhus.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, June, v. 3, No. 2, 155–62. [19 refs.]

In a recent paper [see this *Bulletin*, 1951, v. 48, 795] GISPEN *et al* described the isolation of a strain of *Rickettsia mooseri* from a patient in Djakarta and showed that murine typhus in Java was as common in rural as in urban areas ; in the present paper they describe the isolation of strains of the organism from rats and their ectoparasites.

Direct inoculation of guineapigs had not been found satisfactory but good results were obtained by primary inoculation of mice followed by passage through guineapigs in which identification of the rickettsiae was by complement-fixation tests ; the strains employed as antigens were prepared from yolk-sac cultures, in duck eggs, of strains of *R. mooseri* isolated from patients, rats, rat fleas and rat mites in Java, and an American murine strain was also employed.

Strains were isolated from 9 out of 75 native rats (*Rattus rattus diardi*) and from 7 out of 87 cosmopolitan rats (*R. norvegicus*) in the centre of Djakarta city ; also from 5 of 32 pools of sera from 105 *R. r. diardi* caught in outlying districts. From pools made from 129 fleas (*Xenopsylla cheopis*) found on 37 rats 5 strains were recovered.

No infection was found among 15 shrews from the city, among 27 field rats from the suburbs, among 52 lice from 13 rats, or among 661 ticks from 45 rats.

Four Javanese strains of *R. mooseri*, collected respectively from a rat, a patient, a flea and a mite, and the murine strain from the U.S.A. were found homogeneous by cross complement-fixation tests carried out on guineapigs infected with the strains.

The authors accept *X. cheopis* as the transmitting vector of human murine typhus in Java, but as already stated by Gispen [see this *Bulletin*, 1951, v. 48, 140] the mite *Schöngastia indica* probably transmits infection from rat to rat.

John W. D. Megaw

Rickard, E. R. & Worth, C. B. **Complement-Fixation Tests for Murine Typhus on the Sera of Wild-Caught Cotton Rats in Florida.** *Amer. J. Hyg.* 1951, May, v. 53, No. 3, 332–6. [12 refs.]

Complement-fixation tests were carried out on 712 cotton rats (*Sigmodon hispidus*) caught in a locality in Florida where murine typhus was known to be occurring among commensal rats (*Rattus rattus* and *R. norvegicus*).

The sera of 14·5 per cent. of the cotton rats were positive with murine antigen at titres of 1–8 to 1–64. The positive sera were again tested with normal yolk-sac protein instead of the specific antigen and 77 per cent. of them reacted at approximately the same titres as in the original tests.

Among commensal rats from the same area the fixation titres were usually 1–128 to 1–2,048 ; similar high titres were found to occur among cotton rats which had been inoculated one to six months previously with murine rickettsiae and all these rats survived when challenged by inoculation with murine typhus, whereas 20 of the reacting wild cotton rats challenged in the same way all died so that there was no evidence of any association between complement-fixation titres of 1–64 or under and immunity among the cotton rats.

These findings confirm the opinion already formed by the authors that such titres are non-specific among cotton rats [see this *Bulletin*, 1951, v. 48, 726] which therefore are not considered to be natural reservoirs of infection in the area.

John W. D. Megaw

Hill, E. L., Morlan, H. B., Utterback, Bernice C. & Schubert, J. H. **Evaluation of County-Wide DDT Dusting Operations in Murine Typhus Control (1946 through 1949).** *Amer. J. Pub. Health.* 1951, Apr., v. 41, No. 4, 396–401, 3 figs.

The authors describe a large-scale experiment to test the effects of county-wide control of murine typhus by dusting the runs and harbourage of rats with DDT powder. In two counties, Thomas and Brooks, of South Georgia, dusting was carried out five times between April, 1946, and September 30, 1947 ; an adjoining county, Grady, served as a control.

In extensive surveys it was found that a great reduction in the incidence of the disease followed the dusting ; there was also a considerable reduction in the percentage of infected rats and of flea infestation of the rats.

During the second year after the end of the dusting process there was a noticeable tendency to an increase in the flea-infestation rate and to a less extent in the number of infected rats.

The rat mite, *Liponyssus bacoti*, was not effectively controlled, and the rat louse, *Polyplax spinulosus*, was not significantly reduced in numbers.

The general trend of the findings is shown in the table below.

	Percentage of complement-fixation reactions among rats			*X. cheopis* infestation among rats			Number of cases (approximate)		
	Grady	Thomas	Brooks	Grady	Thomas	Brooks	Grady	Thomas	Brooks
Before April, 1946	46·5	53·7	48·4	45·4	38·2	31·5	39	70	28
May, 1947 to April, 1948	36·0	7·0	3·3	41·4	5·2	1·8	24	3	0
May–November, 1949	36·4	8·9	4·0	59·0	19·1	11·6	22	1	2

John W. D. Megaw

Le Gac, P. Le typhus des savanes chez l'enfant. [**Savannah Typhus in Children.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 169–73, 1 graph.

Two cases of a typhus-like fever are described under the name "*typhus des savanes*" [presumably flea-borne typhus]. In one of the cases rickettsiae are said to have been seen in clumps of ten to twelve cocco-bacillary forms in the monocytes. No mention is made of serological tests.

In both cases there had been a sudden invasion of the homes of the patients by rats fleeing from fires in the neighbouring scrub land.

John W. D. Megaw

Smadel, J. E., Ley, H. L., Jr., Diercks, F. H., Traub, R., Tipton, V. J. & Frick, L. P. **Immunization against Scrub Typhus. I. Combined Living Vaccine and Chemoprophylaxis in Volunteers.** *Amer. J. Hyg.* 1951, May, v. 53, No. 3, 317–25, 1 fig. [15 refs.]

Five groups of volunteers—six to eight in each—were inoculated intradermally with about 22 minimal infecting doses for mice of an "attenuated" Gilliam strain of *Rickettsia tsutsugamushi*. All the eight volunteers of the control group were attacked by typical scrub typhus after an incubation period ranging from eight to ten days. To the persons of the other groups suppressive doses of 3·0 gm. each of chloramphenicol were given every four days, starting eight days after inoculation. All the six members of the group to which three doses were given developed typical attacks of the disease four to eight days after the third dose was given. Among the 22 volunteers of the remaining three groups to whom four, five, and six, doses respectively were given there was no further rise of temperature.

During the period of suppressive treatment inflammatory skin reactions occurred at the site of inoculation and these followed the same course as those in the untreated controls. A black eschar developed in two of the controls and in eight of the 28 treated patients. Mild febrile episodes occurred during the course of the suppressive treatment in all but three of the 28 test volunteers,

but among the 22 who received four or more doses only one had a rise of temperature after the fourth dose.

Rickettsaemia was demonstrated at some time during the second or third week after inoculation in nearly all the persons who received suppressive treatment.

The responses to the *Proteus OXK* and complement-fixation tests were poor in most cases ; the most usual type of *OXK* reaction was a rise in titre from zero or 1–20 to 1–40 or 1–80 ; the fixation titre usually rose from zero to 1–8 or 1–16 but it remained at zero or rose to only 1–4 in two cases in each group. There was a very loose degree of correlation between the two serological reactions.

The authors conclude that the procedure will not be widely applicable except in special circumstances. *John W. D. Megaw*

Jackson, Elizabeth B. & Smadel, J. E. **Immunization against Scrub Typhus. II. Preparation of Lyophilized Living Vaccine.** *Amer. J. Hyg.* 1951, May, v. 53, No. 3, 326–31. [12 refs.]

Technical details are given of a method of preparing relatively stable preparations of lyophilized infective strains of *Rickettsia tsutsugamushi* grown in yolk-sac cultures. The strains employed were the Karp and Gilliam. The preparations showed little loss of infectivity after storage for six to twelve months. *John W. D. Megaw*

Smadel, J. E., Jackson, Elizabeth B. & Ley, H. L., Jr. **Terramycin as a Rickettsiostatic Agent and its Usefulness in Patients with Scrub Typhus.** *Ann. New York Acad. Sci.* 1950, Sept. 15, v. 53, Art. 2, 375–84, 6 figs. [11 refs.]

" Terramycin, like chloramphenicol and aureomycin, has an inhibitory effect on the growth of rickettsial organisms. In experimental infections in eggs, terramycin is more active, milligram for milligram, than either of the other two antibiotics.

" Preliminary studies suggest that terramycin may be somewhat less constant than the other two antibiotics in eliciting dramatic cures when used in the treatment of patients with scrub typhus.

" Terramycin is so much more active than either aureomycin or chloramphenicol in experimental infections with the agent of Q fever, that one looks forward to the trial of this newest antibiotic in the treatment of patients infected with *R. burneti*."

Rose, H. M. **The Experimental and Clinical Evaluation of Terramycin against *Rickettsia akari* (Rickettsialpox).** *Ann. New York Acad. Sci.* 1950, Sept. 15, v. 53, Art. 2, 385–94, 4 figs.

" Terramycin was an effective therapeutic agent against experimental infections with *Rickettsia akari* in mice and in chick embryos. Under the conditions of these experiments, terramycin appeared to be slightly more effective than aureomycin, while both antibiotics were more effective than either chloramphenicol or para-aminobenzoic acid.

" Four patients with rickettsialpox were treated with terramycin. In each patient, the antibiotic appeared to exert a beneficial effect on the course of the disease."

Powell, A. M., Snyder, M. J., Minor, J. V., Jr., Benson, J. F. & Woodward, T. E. **The Use of Terramycin in Rocky Mountain Spotted Fever.** *Bull. Johns Hopkins Hosp.* 1951, July, v. 89, No. 1, 30–38, 4 figs.

Terramycin, one of the youngest members of the antibiotic family, was employed in the treatment of seven proved cases of Rocky Mountain spotted fever in Baltimore during the period May to July, 1950. Six of the patients, aged 3 to 91 years, responded promptly and satisfactorily to the treatment, which consisted of 3·0 gm. as the initial dose, followed by 1·0 gm. every eight hours, orally, till the temperature reached normal and there was obvious clinical improvement. The response was considered to be at least as good as with chloramphenicol or aureomycin. The dose for children was two-thirds of the adult prescription. One patient, aged 34 years, whose treatment commenced about the 8th day, failed to show any improvement after 56 hours and then was given 500 mgm. chloramphenicol intravenously every six hours; within 32 hours there was a distinct improvement but the temperature did not fall to normal till about seven days later. It was thought that the terramycin was not absorbed owing to intestinal atony.

In three cases there were mild gastro-intestinal disturbances, but these did not interfere with the treatment. *John W. D. Megaw*

Bauer, R. E., Parker, R. T., Hall, H. E., Benson, J. F., Joslin, B. S., Hightower, J. A., Snyder, M. J., Venable, S. J. & Woodward, T. E. **Clinical and Experimental Observations with Terramycin in certain Rickettsial and Bacterial Infections.** *Ann. New York Acad. Sci.* 1950, Sept. 15, v. 53, Art. 2, 395–406, 5 figs.

"Data to be regarded as preliminary in nature indicate that terramycin exerts a rickettsiostatic effect when tested in the fertile hen's egg infected with *R. rickettsii*. Two patients with Rocky Mountain spotted fever and one patient with murine typhus responded quite rapidly to terramycin.

"Thirty-two of 33 patients with pneumonia caused by *D. pneumoniae* responded favorably to the antibiotic, and the results were comparable to those obtained with penicillin. One patient with pneumococcal meningitis exhibited a dramatic response to terramycin. A second case of meningitis, complicated by lung malignancy, succumbed although bacteriologically freed of pneumococci.

"The protective index in mice infected with *B. tularense* and treated with terramycin is high in comparison with streptomycin and chloramphenicol.

"Finally, the new streptomyces-derived antibiotic has demonstrated little effect against typhoid fever, typhoid carriers, and *S. cholera-suis* septicemia."

Pereira, H. G., Cardoso, H. & Travassos, J. Resultados inespecíficos da reação de fixação do complemento com antígenos rickettsianos não purificados em cães. [**False-Positive Complement-Fixation Reactions in Dogs tested with Unpurified Rickettsial Antigens.**] *Hospital.* Rio de Janeiro. 1951, Mar., v. 39, No. 3, 315–21, 2 figs. [10 refs.] English summary.

Sera of six dogs from Rio de Janeiro, where rickettsial infection was a remote possibility, gave a considerable number of false-positive complement-fixation reactions when tested with unpurified antigens of the Bengtson type, prepared respectively from yolk-sac cultures of rickettsiae of Rocky Mountain spotted fever (RMSF), South African tick bite fever (SATBF), Q fever, and from normal yolk-sac membranes. The same sera did not give positive reactions when tested with antigens purified with ether, washing and centrifugation.

In control tests of the sera of guineapigs immunized against RMSF or SATBF consistent reactions, at higher titres with the homologous antigens than with the heterologous, were given when purified antigens were employed ; with the unpurified antigens the reactions were inconsistent.

Technical details of the methods employed are given in the paper.

The occurrence of the false-positive reaction appeared to be correlated to some degree with the presence in the unpurified antigens of a high proportion of non-specific protein.

John W. D. Megaw

Fonseca, F., Pinto, M. R., Colaço, A. F., Oliveira, J., Branco, F., da Gama, M. M., Franco, J. S. & Lacerda, M. T. Febre Q em Portugal. Epidemiologia da doença. [**Q Fever in Portugal. The Epidemiology of the Disease.**, Reprinted from *Rev. Clín. Contemporanea.* 1951, Jan., v. 5, No. 1, 23 pp.] 3 figs. English summary.

[This paper is a supplement to the collection of five articles reviewed in this *Bulletin*, 1950, v. 47, 532.]

Q fever has been found to exist throughout Portugal ; 48 human cases have been reported, including four laboratory infections, and positive complement-fixation reactions have been found to occur in 23 per cent. of the cows, in 20 per cent. of the goats and in 27 per cent. of the sheep that have been tested in various provinces.

Rickettsiae have been isolated from ticks attached to a cow and from others found on pigs. Experimental transmission of infection to sheep was carried out by the bite of *Hyalomma rufipes glabrata* which had been infected in the larval stage by feeding on infected guineapigs.

Guineapigs were readily infected by swallowing spleen suspensions of infected mice or yolk-sac cultures of the organism. Monkeys were also infected by feeding them on milk of the artificially infected sheep mentioned above.

The authors believe that most of the cases of human infection resulted from drinking infected milk, and they regard the tick as being essential for the maintenance of infection among the animal reservoirs.

The paper contains an excellent summary of the history of Q fever ; long quotations are given from papers by Derrick and other pioneers in research work on the subject. *John W. D. Megaw*

Giroud, P., Le Gac, P., Brizard, H. & Laurent, G. Réactions allergiques à l'antigène *Rickettsia burneti* chez le personnel africain assurant le ravitaillement et l'alimentation en viande de l'Oubangui-Chari (A.E.F.). [**Allergic Reactions with Q Fever Antigens among Africans Employed in Handling Cattle and their Flesh.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 165–9.

The Giroud " hypersensibility " test showed that a large percentage of persons engaged in handling cattle in Oubangui-Chari gave positive reactions with Q fever antigens. A still larger proportion (80 per cent.) of butchers and other persons who handled the carcasses of the cattle gave positive reactions.

John W. D. Megaw

Blattner, R. J. **Recent Therapeutic Advances in Rickettsial and Viral Infections.** *Southern Med. J.* 1951, Aug., v. 44, No. 8, 685–91.

The chief feature of this paper is that it contains in tabular form a greatly condensed summary of the dosage, toxicity and therapeutic efficacy of substances employed in the treatment of rickettsial and virus infections. The

information supplied has obviously been collected from a large number of published articles, and although no references are given to these the omission is not a serious drawback from the point of view of the general practitioners for whose instruction the paper is intended.

The chemotherapeutic and antibiotic agents that are dealt with include para-aminobenzoic acid, penicillin, aureomycin, chloromycetin and terramycin.

Descriptive lists are given of the vaccines available for prophylaxis.

The text contains a discussion of the mode of action of the chief types of therapeutic substances that have been found effective. *John W. D. Megaw*

YELLOW FEVER

LUMSDEN, W. H. R. **The Night-Resting Habits of Monkeys in a Small Area on the Edge of the Semliki Forest, Uganda. A Study in relation to the Epidemiology of Sylvan Yellow Fever.** *J. Animal Ecology.* 1951, May, v. 20, No. 1, 11–30, 6 figs. [14 refs.]

" 1. The results are reported of a series of observations on monkey-sleeping trees in a small area in the Semliki Forest, Uganda, from January 1948 to March 1949. Eight species of monkeys occurred in the area.

" 2. The trees are divided into five groups on topographical and botanical bases and the preference of the various monkey species studied for each as well as for individual trees.

" 3. Occupation of a single tree by more than one species in the same night was unusual, but several species used any given tree on different nights.

" 4. The movements of an individual band of *Colobus abyssinicus ituricus* (Lowland colobus) are discussed.

" 5. The sizes of the night resting bands are studied and it is concluded that they are fragments of the diurnal bands.

" 6. Some evidence is produced of population changes in the area, probably due to migrations, though these may be only over short distances.

" 7. Some observations on the dirunal activity rhythm of captive monkeys are reported and they are compared with timed observations on the settling into, and leaving from, the night resting trees, of three species in the wild. *C. a. ituricus, Cercocebus albigena johnstoni* (Black mangabey) and *Papio doguera tessellatus* (Anubis baboon) settled in that order in the evening and *Colobus abyssinicus ituricus* tended to remain later in the morning than the other two species.

" 8. The parts of the trees used for resting by the main species of monkey are discussed."

BUXTON, A. P. **Further Observations of the Night-Resting Habits of Monkeys in a Small Area on the Edge of the Semliki Forest, Uganda.** *J. Animal Ecology.* 1951, May, v. 20, No. 1, 31–2.

" Evidence is presented to show that over a period of 5½ years some of the monkeys of Mongiro Forest, Bwamba County, Uganda, have used the same individual trees as night resting places."

LEVI CASTILLO, R. Los mosquitos del Género Haemagogus-Williston, 1896 en América del Sur. [**Mosquitoes of the Genus Haemagogus in South America.**] 1951. Editorial " Don Bosco ", Cuenca-Ecuador. 77 pp., 28 figs. [Bibliography.]

Several mosquitoes of the genus *Haemagogus* are important as natural or laboratory transmitters of the virus of jungle or yellow fever. These insects

have been described, both as larvae and adults, by a number of workers, but some species remain by no means easy to identify, and this in spite of the fact that the total number of species is not great.

The present paper is planned as a contribution to the systematics of the species of *Haemagogus* which occur in South America, of which the author gives a list, including 14 species. It would, surely, have been helpful if he had added the names of several species which occur in Central America, though not in South America. This is followed by keys to the larvae and to the genitalia of the male. Both these keys are unworkable : for instance, the second half of the larval key, from couplet 6 onwards, cannot be related to anything in the first half of the key, because there is no dichotomy leading on to this couplet. The keys are followed by two pages on the general ecology. Towards the end of this, the author gives us an impression that the species of *Haemagogus* normally breed in Bromeliads : later in the same paragraph, he gives a list of a number of " containers" and these, we believe, are the normal breeding places for nearly all the South American species.

[The reviewer is by no means an expert in the Culicines of South America but must record several mistakes or evidences of carelessness. The author finds it necessary to create a new sub-genus and names it *Masculongipalpi*. With his publication he sends a correction slip, altering the name of the sub-genus into *Longipalpifer* : it is not clear why the alteration is made, but certainly the second mane is preferable as Latin. The text of the paper states that a certain group of species constitute this sub-genus, and the slip adds that the type species is *panarchys* Dyar, 1921. In separating the larvae of different species of *Haemagogus*, the villosity of the cuticle is a well-known and useful character, shown in *H. capricorni* and *spegazzinii* : it is not, however, shown in the author's figures or mentioned in his description of the larvae. But for the fact that the author says that his figures were drawn from nature, it might have been thought that several of them had been re-drawn, perhaps not very precisely, from the monograph by KUMM and others. Among misprints, we have noticed that the initials of S. W. WILLISTON are transposed (p. 16) ; the name of the mosquito is *H. anastasionis* (not *anastationis* as given on p. 23).

We have felt it necessary to state in detail some of the grounds which lead us to be far from satisfied with the present review. Our views may be compared with a previous notice by another hand of another publication by the same author (this *Bulletin*, 1949, v. 46, 1193).] *P. A. Buxton*

RABIES

BÉQUIGNON, R. & VIALAT, C. Les vaccinations antirabiques à l'Institut Pasteur en 1950. [**Anti-Rabies Vaccination in the Pasteur Institute in 1950.**] *Ann. Inst. Pasteur.* 1951, July, v. 81, No. 1, 72–6.

In 1950, anti-rabies vaccination was administered to 105 persons, all but three of whom had been bitten in metropolitan France : these three had been bitten in Africa.

In 97 cases, dogs (45 of them stray) were responsible. Cats accounted for the bites in two cases and a monkey and a fox for one each. In all cases, the dogs were suspected of having rabies, but in none was this confirmed by animal inoculation or histological examination. Six animals were, however, diagnosed clinically on veterinary examination.

In 80 of the 105 cases the bite was deep and in 90 it was inflicted on the bare skin. In 70 cases the bite was on an upper and in 30 on a lower limb. The head was affected in only 5 cases.

In 89 cases, a week or less had intervened between the bite and the institution of treatment. In the remaining 16 cases, the interval was 8 to 21 days.

A table shows that the patients came from 24 *départements* : in nearly all, no more than one to three cases occurred, but there were 51 in the Seine and 12 in Seine-et-Oise.

There were no paralytic accidents and no deaths among those treated by vaccination. *H. J. O'D. Burke-Gaffney*

MANNINGER, R. La profilaxis de la rabia. [**Prevention of Rabies.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 252–67, 8 figs. & 1 chart.

VITTOZ, R. Profilaxis de la rabia en Indochina y en Extremo Oriente. [**Prevention of Rabies in Indo-China and in the Far East.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 196–251. [Bibliography.]

PLAGUE

GIRARD, G. La peste. Contribution apportée par Madagascar à l'état actuel de nos connaissances. [**The Contribution made by Madagascar to Knowledge of Plague.**] *Rev. Coloniale de Méd. et Chir.* 1951, June 15, v. 23, No. 191, 138–44. [15 refs.]

In this eminently readable article the author reviews the important contributions to knowledge of plague which have been made during the past thirty years by French workers in Madagascar. The preponderant part played by the author is shown by the fact that among the 14 papers listed in the bibliography nine were by himself and three others by him in collaboration with one of his colleagues.

Special attention is directed to pneumonic plague which is shown to be intimately connected with rat plague and bubonic plague, and the article concludes with the reminder that apart from the rodent and its fleas there would be no human plague.

The conclusions stated in the paper will meet with universal acceptance, with the possible exception of one, which is that the exalted virulence of the organism resulting from multiple passages through the human lung is the dominant factor in the spreading of epidemics of pneumonic plague. This view is hardly compatible with the remarkable tendency of these epidemics to occur as explosive outbreaks and to be self-limited even in the absence of measures of control. The devastating epidemic in Manchuria in 1910–11 might be quoted as an example of increased virulence due to passage from man to man, but the circumstances were quite exceptional and, as the author himself states, this epidemic was an anomaly in the history of modern plague.

The other important contributions deal with preventive vaccination by an attenuated living strain of *Pasteurella pestis*, with chemoprophylaxis and chemotherapy. The paper, as a whole, shows that the fullest advantage has been taken of the special opportunities afforded by Madagascar for the study of plague occurring in varied climatic conditions. *John W. D. Megaw*

SHARIF, M. **Spread of Plague in the Southern and Central Divisions of Bombay Province and Plague Endemic Centres in the Indo-Pakistan Subcontinent.** *Bull. World Health Organization.* Geneva. 1951, v. 4, No. 1, 75–109, 8 figs. (maps.) [17 refs.]

This study of the distribution and dissemination of plague in India from 1930 to 1935 will interest everyone concerned with control of the disease ; it

confirms to a large extent existing views but it also extends and clarifies knowledge of the subjects with which it deals.

The author describes a detailed study of the seasonal and geographical distribution of plague in certain areas of the Bombay Province ; he concludes that in the climatic and other conditions prevailing in these places the disease is maintained solely by domestic rats and the degree of prevalence depends on the activities of the rat fleas, which in turn depend on seasonal climatic conditions.

In certain localities human infection dies out during the hot and dry season but a few rats living in the open country remain infected ; the onset of the rains drives the rats into human dwellings and produces conditions favourable for the multiplication of the rat fleas so that infection among the rodents flares up and becomes transmitted to the person living in association with them.

In the larger commercial centres plague at present is seldom prevalent among the human population because most of the rats have become immune, but infection still persists among the few susceptible rodents whose fleas when transported with grain or other materials can cause explosive outbreaks among the rats of villages from which the disease has disappeared.

In hot lowland areas such outbreaks occur during the cool rainy season and die out completely during the hot weather. In the cooler hill tracts infection tends to persist throughout the year among both rats and human beings ; from these foci infection is conveyed from time to time to surrounding areas. Two such foci were studied in the Bombay Province. An examination of the records shows that in the whole of India and Pakistan there are seven main endemic centres of infection ; three are in the submontane areas of the Himalayas, three in watersheds in South India and one in Central India.

The only areas in the sub-continent which have remained free from infection are the excessively hot and dry desert areas and exceedingly damp areas such as East Pakistan (formerly called Eastern Bengal) and Assam.

In the discussion it is tacitly—and justifiably—assumed that plague in India has followed its natural course and has been little affected by the measures of control that have been carried out.

The value of the present survey is in helping to define the areas in which control of rats, and especially of their fleas, is likely to produce lasting results.

John W. D. Megaw

Devignat, R. & Boivin, A. Sur la biochimie des souches centro-africaines de peste du Congo belge. [**The Biochemistry of Central-African Strains of Plague in the Belgian Congo.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 5/6, 279–84, 1 fig.

The authors summarize the results of 26 biochemical tests applied to liquid cultures of 42 strains of *Pasteurella pestis* isolated from rats and patients in the Lake Albert region of the Belgian Congo.

The most characteristic feature of the strains is that they belong to the glycerin-fermenting group as indicated by a colorimetric test in which bromthymol blue is employed as the indicator. Details of the methods are given in the paper.

The authors suggest that the name " the ancient variety of plague " should be given to the glycerin-positive strains. Their study is intended as a contribution to a survey of the distribution in different parts of the world of the glycerin-positive and glycerin-negative strains of plague bacilli.

The paper contains a description of a simple apparatus by which large numbers of sugar fermentation and other biochemical tests can be carried out with great economy of time and materials. *John W. D. Megaw*

Seal, S. C. & Mukherji, S. P. **Hydrolysate of Casein as a Fluid Medium for the Growth of** *Pasteurella pestis*. *Ann. Biochem. & Exper. Med.* Calcutta. 1950, v. 10, Nos. 3/4, 79–98, 9 charts. [21 refs.]

The authors describe the production of a liquid medium free from non-specific proteins for the cultivation of *Pasteurella pestis*. Commercial milk casein is hydrolysed with H_2SO_4+HCl for 72 hours and neutralized by $BaCO_3$ and NaOH. A little magnesium, iron, and alcoholic extract of liver are added. The rate of growth compared favourably with that occurring in nutrient broth and an active specific protein was obtained in the filtrate.

The resultant vaccine was much less toxic to mice, more potent and less costly than the Haffkine broth vaccine. There was no loss of potency after storage for 8 months at 37°C.

The following figures are given in a table.

	Mouse-protective dose	Toxic dose
Haffkine broth vaccine	·006 ml.	0·2 ml.
Casein hydrolysate broth (1,000 million organisms per ml. 3-days' growth)... ...	·0053 ml.	0·8 ml.
Agar vaccine (1,000 million organisms per ml.)	·0048 ml.	1·8 ml.

John W. D. Megaw

Seal, S. C. **Casein Hydrolysate Agar—a New Solid Medium for the Growth of** *Pasteurella pestis* **and Allied Organisms.** *Ann. Biochem. & Exper. Med.* Calcutta. 1950, v. 10, Nos. 3/4, 99–102.

An agar solid medium specially suitable for the growth of *Pasteurella pestis* and allied organisms was prepared by the addition of 2·5 per cent. agar to the casein-hydrolysate broth referred to in the preceding paper.

The yield of growth in Roux bottles was 10 times greater than was obtained by nutrient agar and 2½ times greater than was obtained from the same amount of casein hydrolysate employed as a broth culture.

For counting the number of living *P. pestis* contained in broth cultures the medium was nearly as good as the 5·0 per cent. rabbit-blood medium employed by Sokhey since 1939. It is said to be the best obtained up to the present time without employing blood or serum.

Among the special advantages claimed for the medium are, elimination of the troubles incidental to procuring rabbit blood on a large scale and the obviation of the risks and drawbacks associated with the use of blood or serum media for the cultivation of *P. pestis* intended for use as a vaccine or as an inoculum in the preparation of anti-plague serum.

Details of the method of preparation are given. *John W. D. Megaw*

Jany, E. Das "Baumleben" von Ratten unter besonderer Berücksichtigung der Wanderratte (*Rattus norvegicus*). [**"Tree-Living" among Rats, with special reference to** *R. norvegicus*.] *Ztschr. f. Hyg. Zool.* 1951, v. 39, No. 4, 103–8. [11 refs.]

This is an interesting essay on the tree-frequenting habits of rats, with special reference to *Rattus norvegicus*, a species whose tree-climbing habits have received little attention.

There are references to ten articles in German and to one in English but most of these deal with the economic damage done to fruit trees by marauding rats. Attention is called to the need for avoiding the planting of trees so close to buildings as to allow rats to enter the upper stories by climbing along the branches and so to nullify the effects of rat proofing.

An example is given of information obtained by patient rat-watching, a pursuit which deserves encouragement because of the light it may throw on the problem of rat control. *John W. D. Megaw*

DEVIGNAT, R. Une technique quantitative d'agglutination rapide de *Pasteurella pestis*. [**A Rapid Quantitative Agglutination Test for Plague.**] *Rev. d'Immunologie*. 1951, v. 15, No. 3, 173–6.

The test described is said to be on the same lines as the one proposed by ZAMMIT and ALCOCK [see this *Bulletin*, 1917, v. 10, 283]. Ten serum dilutions are prepared and one or two drops of each are placed inside one of a series of small circular spaces surrounded by a ring of grease ; the rings are placed on the flat inside surface of a Petri dish instead of on a glass slide. To each of the samples of diluted serum is added an equal amount of bacterial suspension made from a one- or two-day broth culture of *Pasteurella pestis* which has been kept constantly agitated by a stream of air during the period of growth, and which has been stabilized by formol. Mixture of the serum and suspension is by a rotary movement of the Petri dish, which is then placed for ten minutes in an incubator at 37°C. The dish is then rotated gently about 50 times, after which it is laid flat on a black surface. Within about 20 minutes the reaction is complete and is easily read, with the help of a hand lens.

The titres observed were found to correspond closely with those occurring with tube tests, the advantage claimed being much greater rapidity.

John W. D. Megaw

DEVIGNAT, R. Une réaction d'agglutination initiale entre antigène pesteux adsorbé sur collodion et son anticorps et *vice versa*. [**An Initial Agglutination Reaction with Plague Antigen Adsorbed on Collodion, and with Plague Antibody Adsorbed in the same Way.**] *Rev. d'Immunologie*. 1951, v. 15, No. 3, 177–81, 1 fig.

The author admits that he does not know the significance of the two tests described. In the first the antigen is made from a broth culture grown in the manner described in the preceding paper but incubated for 7 to 11 days, by which time the plague bacilli were lysed ; the culture was treated with alum and the precipitate was washed and centrifuged, then redissolved in citrate solution and adsorbed by collodion emulsion by a complicated technique described in the paper.

The adsorbed antigen was employed in carrying out agglutination tests on the lines described in the preceding paper. A faint delayed reaction occurred with titres up to 1–320 but at higher titres it occurred earlier and was more pronounced, reaching the maximum at 1–1,280 ; at a still higher titre of 1–5,120 it became negative.

In the second test immune serum diluted to 1–320 was adsorbed with collodion and tested against various dilutions of plague antigen ; the maximum degree of agglutination occurred with antigen dilutions of 1–8, the reaction became progressively less pronounced with lower dilutions of 1–4 and 1–2 and also with higher dilutions of 1–16 and 1–32. *John W. D. Megaw*

CHOLERA

Sato, K., Tadokoro, I., Kurihara, T. & Ibuka, K. **Studies on the Type-Specific Antigens of *Vibrio cholerae*.** *Japanese J. Exper. Med.* 1950, Sept. 30, v. 20, No. 6, 647–56.

The results are reported of investigations on the chemical fractions of *V. cholerae* with which type-specificity in serological tests is associated. Bruce White had found both the type-specific and group-specific characters to be associated with a polysaccharide fraction, but in earlier work in the reporting laboratory these characters had been related mainly to a nucleoprotein fraction. As it is considered possible that the methods employed in the extraction of the nucleoprotein may not have produced a product entirely free from polysaccharide the subject was reinvestigated by more suitable chemical methods. Pure protein and polysaccharide fractions were prepared from Inaba and Ogawa forms of *V. cholerae* and their serological reactions were investigated by complement fixation and absorption tests against antisera raised in rabbits with Inaba- and Ogawa-type vaccines.

The results with the pure protein fractions in complement fixation tests were found to be type-specific, with antibody titres parallel to those in agglutination tests with untreated vibrio cells. "It was observed that the protein fractions free from polysaccharide were extremely antigenic and also [played] a dominant part in the type-specific antigenicity in complement fixation tests and agglutinin absorption tests."

The polysaccharide fractions prepared by the method used were found to be entirely non-antigenic. It is considered that this may possibly be due to deacetylation as the result of the alkali treatment used in extraction, but further studies on the point are required. *J. Taylor*

Felsenfeld, O., Soman, D. W., Young, Viola M., Yoshimura, T., Waters, Thora & Ishihara, S. J. **Serologic Cross-Reactivity of some Enterobacteriaceae isolated in the United States with Cholera Vibrios.** *Proc. Soc. Exper. Biol. & Med.* 1951, June, v. 77, No. 2, 284–6.

The possible serological relationship of intestinal organisms to *V. cholerae* was investigated by slide agglutination tests with "O-H" high-titre sera, prepared against Inaba and Ogawa strains, on 315 strains isolated from stools in Chicago. These included *Bact. coli*, *Bact. aerogenes*, *Paracolobactrum*, *Proteus*, *Pseudomonas*, *Bact. alkaligenes*, *Streptococcus*. Of the total, 49 were found to agglutinate with the Inaba serum and 5 with the Ogawa serum. By means of the serial test-tube method, positive reactions were given by 7 (2·2 per cent.) of the examined organisms [titres not stated]. Further tests were carried out with sera prepared in rabbits with formolized and heat-killed *V. cholerae* cultures. The serum prepared against the heat-killed culture agglutinated one *Bact. coli* and one *Proteus morgani* strain in heated suspension at 1 in 40 to 1 in 160. The serum prepared against the formolized culture agglutinated formolized suspension of 5 strains of *Bact. aerogenes* and one strain of *Proteus morgani*.

The relationship of these Enterobacteriaceae to salmonellae and brucellae which are known to have antigenic fractions in common with *V. cholerae* was then investigated by cross-agglutination tests with cholera and non-cholera sera against the bacterial antigens, and by absorption experiments with Inaba "O-H" serum. From the results it is concluded that the common antigen of the Enterobacteriaceae and *V. cholerae* is the "A" of the vibrio and part of its "H" antigen which also occurs in brucellae and salmonellae. [It seems unlikely that the partial relationships shown would lead to any difficulty in diagnosis of *V. cholerae* by the methods ordinarily employed.] *J. Taylor*

Felsenfeld, O., Soman, D. W., Ishihara, S. J., Waters, Thora & Norsen, Jeannette. *In vitro* **Sensitivity of recently isolated Cholera Vibrios to Ten Antibiotics.** *Proc. Soc. Exper. Biol. & Med.* 1951, June, v. 77, No. 2, 287–8.

Fifty-three cholera vibrio strains received shortly after their isolation in Egypt, India and Indo-China were tested by the tube-dilution method for their sensitivity to ten different antibiotics—penicillin G, penicillin O, streptomycin, chloromycetin, aureomycin, neomycin, terramycin, polymyxin D, bacitracin and prodigiosin. Wide differences in susceptibility were shown according to the geographical origin of the strains, some of those from Bengal, Assam and Indo-China being comparatively resistant as judged by the concentrations of the antibiotics required to inhibit their growth. No strains were encountered which were resistant to neomycin or terramycin. The small number of strains tested with prodigiosin were found to be highly sensitive to its action.

J. Taylor

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

Vivoli, F. & Müller, G. La diffusione dell'amebiasi nel Comune di Ancona. [**The Spread of Amoebiasis in the District of Cremona, Italy.**] *Riv. Italiana d'Igiene.* 1949, Jan.–June, v. 9, Nos. 1/6, 5–12. English summary (8 lines).

Amoebiasis was considered at one time to be a tropical disease but is now known to have a universal distribution. In Italy, it is particularly prevalent in Sicily, Sardinia, Lombardy and Emilia. Its incidence rate of 1·4 per 100,000 in 1924–26 is said to have gone up to 2·4 by 1938–39 and, in spite of the law, many cases are not notified. The results of the examination of 3,092 specimens of stool for parasites at the Public Health Laboratory of Cremona over the 11-year period 1937–47 are tabulated, and show that *E. histolytica* has been demonstrated in 483 of these specimens. These 483 cases came from 364 households. It is emphasized that dysenteric symptoms may be absent in many such cases and only vague abdominal symptoms, including constipation, may be caused by the presence of the parasite. Refugees from the Dalmatian coast and Negro troops in the Allied Armies, and wartime damage to housing, water supplies and sewerage, are among the factors which are believed to account for the rise in prevalence. But invasion by this parasite is believed to be still spreading and measures for its control are suggested, including a health education campaign, and a systematic search of the stools of food handlers and of persons who are in communal contact in colleges, boarding schools and factories : the provision of laboratory facilities will have to be increased if such a systematic search is decided upon.

J. Cauchi

Balamuth, W. **Biological Studies on *Entamoeba histolytica*. III. Induced Encystation in Several Mediums, including an Account of a New Procedure.** *J. Infect. Dis.* 1951, May–June, v. 88, No. 3, 230–36. [13 refs.]

This investigation was concerned with the search for a reliable method for the production of encystation in cultures of *E. histolytica*. A series of quantitative experiments on the growth of the N.R.S. strain of this parasite was made in different media. The selection of a suitable encystment medium was based partly on the belief that encystment was preceded by rapid growth in culture for which a rich type of medium would prove necessary. Having been grown

on relatively poor medium, the amoebae were then transferred to several available types already described in the literature and also to a new one which the author has devised. The latter consists of liver concentrate powder, agar and phosphate buffer, at *p*H 7·2, as base, with overlay of double strength egg-yolk infusion, with or without normal horse serum, plus rice starch. After all the rice starch had been exhausted in the poorer pre-encystment medium, inoculation was then made to the rich types being tested. The cysts were harvested by centrifugation, washed in distilled water several times and then stored at 4°C. to kill vegetative forms. A rapid multiplication generally resulted from the transfer and encystment invariably followed in the media chosen, but one strain failed to encyst at any time. The best yields resulted after 48 to 72 hours' culture. Total counts of the number of cysts and their percentage formation from amoebae originally present were made. Attempts were also made to enumerate the viable forms with 4 nuclei, by subculture and iodine staining. The vital significance of the bacterial flora present has been recognized and by means of it the oxidation-reduction potential of a culture is controlled. It is also known that marked encystation in a culture is correlated with a rise in this value. The author has also noted that the bottom surface area of the culture flask affects encystation, being more favourable when small, and he points to the diversity of factors which influence the problem. Results with the two strains of *E. histolytica* mainly investigated indicated that the new medium of the author was superior to others tried in bringing about encystation.

J. D. Fulton

Balamuth, W. & Wieboldt, Mary L. **Comparative Growth Cycles of *Endamoeba histolytica* with Different Combinations of Bacteria.** *Amer. J. Trop. Med.* 1951, Mar., v. 31, No. 2, 192–205, 3 figs. [26 refs.]

The authors record the results of a study of the effect of concomitant bacteria upon the growth of *Entamoeba histolytica* which was maintained in Balamuth's medium [this *Bulletin*, 1947, v. 44, 1066]. An analysis of the bacterial flora accompanying the amoebic strain (by staining, biochemical reactions and plating) revealed the presence of three types of Gram-negative, non-spore-forming bacilli, identified as *Bacterium coli communius, Bact. c. anaerogenes* and an " anaerogenic paracolon bacillus ". These organisms—as well as *Bact. aerogenes, Bact. coli commune, Proteus vulgaris, Bact. cloacae, Kurthia zenkeri, Streptococcus equinus, S. faecalis* and *S. liquefaciens*—were isolated and successfully used to establish monobacterial cultures with E. *histolytica*. For this purpose, cultures containing amoebic cysts were first purified by treatment with 1 : 50,000 aqueous mercuric chloride for 90 minutes at 4°C., after which they were subjected to centrifugal washing in sterile distilled water. The authors believe that chemical treatment of cysts is a more reliable and practicable method for the removal of bacteria than micro-manipulation. The effect of the individual bacteria upon the amoebae was determined by their excystation and growth in a diphasic medium in the presence of rice starch, and the cultures were checked for possible contamination. Positive cultures were then maintained by subcultures in Balamuth's medium.

When the monobacterial cultures of the amoebae were plotted in the form of growth curves, it was found that the relative growth response of the amoebae in the presence of different bacteria corresponded to the order in which the latter are arranged in the above list. There was no correlation between bacterial and amoebic growth, and the size of the inoculum had no controlling influence. However, growth was most abundant when the amoebae were accompanied by the original mixed flora. *C. A. Hoare*

CASTORINA, S. Sulla frequenza dell'eziologia amebica nelle formazioni ascessuali del fegato in Sicilia. [**On the Frequency of *Entamoeba histolytica* as the Cause of Liver Abscess in Sicily.**] *Acta Med. Italica.* 1951, Mar., v. 6, No. 3, 73–6. English summary.

The author quotes HUARD and MEYER MAY who recorded in Tonking in 1946 that of 150 patients with liver abscess 43 gave a definite history of preceding dysentery, 41 an uncertain history, while 66 denied any previous attack of dysentery. In 70 of the patients whose faeces were examined for *E. histolytica*, 5 proved positive, 65 negative ; in 93 of whom the liver pus was examined, 7 showed *E. histolytica*, 27 showed pyogenic organisms ; in the other 59 the pus was sterile. Of 95 in whom the pus had the aspect of " amoebic pus " 7 showed the *Entamoeba*, 88 were " non-amoebic or sterile ".

The author then gives his own findings in 74 cases of liver abscess at the Catania University Clinic in the 12 years 1938–50. Fifty-six (75·6 per cent.) were amoebic, 7 were pyogenic, solitary in 3, multiple in 4, and the remaining 11 were suppurating hydatid cysts. Of the 56 amoebic patients 50 were males, 6 were females. A history of preceding dysentery was given in 47·5 per cent. [the author's figures are given in percentages, 26 would be 46·4 per cent., and 27 would be 48·2] ; puncture extracted typical chocolate-coloured pus in all 56 ; in 54·5 per cent. of those whose faeces were examined *E. histolytica* was found, and in 14·3 per cent. of those whose liver pus was examined.

H. Harold Scott

TRIBEDI, B. P. & ROY, A. R. **An Uncommon Complication of Amoebic Liver Abscess.** *Indian J. Med. Sci.* 1951, June, v. 5, No. 6, 242–5, 1 fig.

GARIPUY, A. & MAGDELENAT, P. Trois cas d'éosinophilie forte au cours d'hépatites amibiennes larvées. [**Three Cases of Marked Eosinophilia in Latent Amoebic Hepatitis.**] *Maroc Méd.* 1951, July, v. 30, No. 314, 626–8.

BRADNER, W. T. & RAWSON, G. W. **An *in Vitro* Method of Screening Amebicidal Agents using the Phillips Culture.** *Science.* 1951, June 15, 674–6.

The difficulties encountered in the testing of potential amoebicides *in vitro* are well recognized, the chief being the effect which certain agents may exercise on the bacteria present in culture. Recently PHILLIPS [this *Bulletin*, 1950, v. 47, 624, 741] has been able to culture *E. histolytica* with *T. cruzi* in absence of bacteria. In the present investigation the results obtained *in vitro* with such a culture were compared with those obtained with *E. histolytica* growing in presence of a mixed bacterial population on egg slants. Various established amoebicides including emetine were used in the tests, as well as antibiotics. Controls with *T. cruzi* alone and also bacterial flora alone were used to observe the effect of the test substances in absence of amoebae. Each drug was originally made up in sodium thioglycollate, a constituent of the Phillips's medium, and was tested at concentrations ranging from 1 : 1,000 to 1 : 128,000. After incubation the end points, shown in a table, were regarded as the highest dilution of the drug which inhibited the growth of the test organisms, determined microscopically and by subculture. There was good correlation in the results obtained with the two types of media, that with *T. cruzi* being generally about twice as sensitive and never less sensitive than the other. Inhibition of bacteria was general and varied in degree in different media with the antibiotics used but *T. cruzi* remained unaffected by all the drugs. It is concluded that the use of cultures of *E. histolytica* with *T. cruzi* should prove a suitable means of *in vitro* testing of potential amoebicidal agents. *J. D. Fulton*

Most, H. & van Assendelft, F. **Laboratory and Clinical Observations on the Effect of Terramycin in the Treatment of Amebiasis.** *Ann. New York Acad. Sci.* 1950, Sept. 15, v. 53, Art. 2, 427–8.

"Terramycin has been found highly active *in vitro* against *E. histolytica*, as well as against the associated bacterial flora. In daily doses of 1·0 and 2·0 grams by mouth for ten days, terramycin therapy resulted in the disappearance of *E. histolytica* from the stools of all but one of 22 patients. Parasitic relapse occurred in this individual on the eleventh day after treatment, whereas, in the remaining 21 subjects, the stools have remained negative to date. In addition, terramycin successfully eliminated other intestinal amebae but was ineffective against helminths and intestinal flagellates.

"From these results, it appears probable that terramycin will prove to be an extremely valuable agent in the therapy of intestinal amebiasis."

Most, H. & van Assendelft, F. **Laboratory and Clinical Observations on the Effect of Terramycin in the Treatment of Amebiasis.** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 284–5.

The authors [above] have already demonstrated the *in vitro* and the *in vivo* activity of terramycin on *Entamoeba histolytica* and other human intestinal amoebae, and their bacterial associates. Fifty-four patients with proven intestinal amoebiasis have now been treated with this compound. The dosages employed were 1 gm. for children or 2 gm. for adults daily for 5 or 10 days. Of 37 persons treated with 2 gm. daily for 10 days all but one have remained free from parasitic relapse (as judged by an average of 9 stool examinations over an average period of 150 days). Of the remaining 17 patients, treated with a lower or shorter scheme of dosage, 4 have relapsed (as judged by an average of 3.5 stool examinations over an average of 12 days' observation). The authors conclude that "Terramycin has been found to be highly active against *E. histolytica* in culture and in man. The optimum dosage at present appears to be 2·0 grams daily for ten days." *A. R. D. Adams*

Crosnier, R., Darbon, A., Ducourneau, P., Bouilloc, J., Martin, M. & Ricossé, J. Remarques préliminaires sur le traitement de l'amibiase intestinale aiguë par la Terramycine. [**Preliminary Note on the Treatment of Acute Intestinal Amoebiasis by Terramycin.**] *Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1951, Nos. 21/22, 875–8.

Most and his colleagues have reported on the therapeutic treatment of cases of amoebiasis with terramycin, with aureomycin, and with bacitracin [this *Bulletin*, 1950, v. 47, 1089 and 1200; and above]. Their results suggested that terramycin freed 100 per cent. of patients of intestinal *E. histolytica* infections, aureomycin freed 60 per cent., and bacitracin 28 per cent.

The present authors treated with terramycin 17 patients suffering from acute attacks of amoebic dysentery contracted in Indo-China. The amount of drug given was 3 gm. daily for 5 days and then 2 gm. daily for another 5 days, in divided doses. There were no toxic side effects. The clinical response was spectacular; in all cases amoebae vanished from the stools early in the treatment. [Details are set out in a table.] In a single case, though the amoebae vanished and the clinical response was excellent, cysts were found to be present in the stools at the end of treatment.

Two other patients suffering from acute relapses of amoebic dysentery after aureomycin treatment were also treated with terramycin; they responded as satisfactorily as did the others.

It is too early to assess the full effect of terramycin in amoebiasis ; but its immediate effect on the amoebae and the clinical condition in acute dysentery was beyond question. In six cases of which news [but not stool examinations] was subsequently forthcoming for periods of up to six months after treatment there was no symptomatic evidence of persistence of the infection or of relapse, and the general health was regarded as excellent. *A. R. D. Adams*

THIODET, J., PIETRI, H., FOURRIER, A., MASSONNAT, J. & AUBRY, P. L'auréomycine dans l'hépatite amibienne suppurée à propos de deux observations. [**Aureomycin in Amoebic Liver Abscess : Two Observations.**] *Algérie Méd.* 1950, Aug.–Sept., v. 54, No. 7, 385–8.

Two Africans suffering from amoebic liver abscess were treated in Algeria with emetine and aureomycin. In the first case the right diaphragm was raised, and there was a cough with the expectoration of blood-stained purulent material. No amoebae were found in the stools or in material aspirated from the liver at its upper level. Treatment with penicillin, emetine, and direxiode [diodoquin] produced no material improvement, and the cough and characteristic expectorated material continued. Aureomycin was then given ; the patient's condition rapidly improved, the cough and the coloured and foetid sputum gradually vanished. The abscess was aspirated from time to time. After a total of 18 gm. of aureomycin, with the addition of streptomycin for a time, the patient appeared to be cured.

In the second patient, a Senegalese, there was marked enlargement of the liver downwards. The abscess was thought to be in the left lobe. Again no amoebae were found on diagnostic aspiration and no *E. histolytica* were found in the stools. Aureomycin given alone failed to relieve the symptoms and signs. Concurrent aureomycin and emetine treatment then produced immediate relief of symptoms and the eventual disappearance of the physical signs. Therapeutic aspiration of pus was done during the treatment.

The authors consider their first case to have been a liver abscess discharging into a bronchus, and their second a closed liver abscess. In the first case emetine failed to affect the discharge of abscess matter from the lungs, but aureomycin did so. In the second case aureomycin had little effect, but emetine rapidly produced a cure. The aureomycin therefore exerted no action on the amoebae, but it acted on the bacterial contaminants. Aureomycin therefore cannot replace emetine as the basis of treatment of an amoebic liver abscess ; it is a valuable adjuvant to emetine where secondary bacterial infection is present. *A. R. D. Adams*

HRENOFF, A. K. & NAKAMURA, M. *In vitro* **and** *in vivo* **Studies of a New Antibiotic, Fumagillin, with** *Endamoeba histolytica*. *Proc. Soc. Exper. Biol. & Med.* 1951, May, v. 77, No. 1, 162–4.

MCCOWEN *et al.* [this *Bulletin*, 1951, v. 48, 640] have demonstrated the *in vivo* and *in vitro* activity of fumagillin, a crystalline antibiotic isolated from *Aspergillus fumigatus*, on *E. histolytica*. The present authors have confirmed its activity on cultures of this parasite at dilutions of 1 : 10 million to 1 : 15 million. The culture of *E. histolytica* used was grown in association with *T. cruzi* for periods of 48 hours at 37°C., and the drug, insoluble in water, was dissolved in N /100 NaOH and used in serial dilutions. Such alkaline solutions in absence of drug were found to be non-toxic for amoebae and the drug did not affect the trypanosomes. Tests were also made on 14 monkeys, of two species, naturally infected with *E. histolytica*. Each animal received 50 to 125 mgm./kgm. by mouth daily for 5 days, without toxic effects, except possibly some

slight liver damage in the highest dose. Fumagillin appeared to possess considerable *in vivo* activity as the infection was eradicated in more than half the number of animals. The results confirm those of the earlier authors.

J. D. Fulton

GAMBARDELLA, A. & CHIEFFI, G. Prime ricerche sperimentali sull'azione del tiosemicarbazone (Tb. 1/698) su culture di *Entamoeba histolytica*. [**The Action of Tb. 1/698—Thiosemicarbazone—on Cultures of** *Entamoeba histolytica*.] *Acta Med. Italica*. 1951, Apr., v. 6, No. 4, 100–101. English summary (3 lines).

Entamoeba histolytica, obtained from the stools of two patients who were suffering from acute amoebic dysentery, was grown in a culture medium where it takes 2 to 4 days to develop fully and usually survives 9 days or over. With this medium it has been found possible to make as many as 18–21 successive subcultures of the strain. *E. histolytica* from a third serial subculture was inoculated into the medium, to which thiosemicarbazone had been added without altering the *p*H which was 6·8 to 7·0 ; the cultures were kept at 37°C. and read every 24 hours for 9 days ; 6·25 mgm. or more of thiosemicarbazone in 5 cc. of culture medium acted quickly on the *Entamoeba* so that it was no longer viable on further culture or subculture. *J. Cauchi*

DEVIGNAT, R., LEGROS, A. & VERCAMMEN-GRANDJEAN, P. La coccidiose humaine à Costermansville. [**Human Coccidiosis at Costermansville.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1467–71, 1 pl. [23 refs.]

Since human coccidiosis has not hitherto been reported from the Belgian Congo and central Africa in general, the authors place on record the finding of two cases of infection with *Isospora hominis* [=*I. belli*] in Europeans resident in Costermansville and in the province of Kivu. The course of infection was mild, with symptoms of diarrhoea. A description (illustrated by a plate of figures) is given of the oöcysts, and previous data on the distribution and symptoms of human coccidiosis are reviewed. *C. A. Hoare*

RELAPSING FEVER AND OTHER SPIROCHAETOSES

GREGSON, J. D. **Notes on the Occurrence of** *Ornithodoros hermsi* **in British Columbia, and its probable relation to Relapsing Fever. Argasidae, Ixodoidea.** *Proc. Entom. Soc. B.C.* 1949, v. 45, 15–16. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, May, v. 39, Pt. 5, 90.]

In 1948, *Ornithodoros hermsi* Wheeler was taken in a house at Summerland, British Columbia, where it attacked one of the occupants on several occasions while she was in bed and was then found in some numbers in a bird's nest in the eaves. It is a vector of relapsing fever in the western United States and may have been responsible for cases of the disease that occurred in British Columbia in 1930, 1932 and 1937. Although an Argasid tick was then suspected as the vector, none was found.

DOLMAN, C. E., KERR, Donna E., CHANG, Helen & SHEARER, A. R. **Two Cases of Rat-Bite Fever due to *Streptobacillus moniliformis*.** *Canadian J. Pub. Health.* 1951, June, v. 42, No. 6, 228–41, 5 figs. [41 refs.]

The two patients, cousins aged 12 months and 3 years respectively, lived in a dilapidated house, overrun with rats, at the entrance to Vancouver harbour. The younger was bitten on the finger by a rat and, by the second day following, the whole hand had become swollen and painful ; a rash was spreading from the arm to the body, and the infant was feverish and looked very ill. The symptoms soon subsided without treatment but, 6 days later, the child again became ill with fever and vomiting. An urticarial rash appeared on the back, legs and buttocks, but by next day the child had again recovered and appeared quite normal. Five days later, however, there was a second recrudescence of symptoms, and the child was admitted to hospital, where she remained for 3 months. A marked secondary anaemia developed. The temperature fluctuated widely, and reached 103°F. during one of the 3 or 4 exacerbations of fever which occurred. A few urticarial plaques appeared at the time of each pyrexial attack.

Two nights after this infant was bitten the second child was bitten, in the thumb, and the symptoms in her case paralleled those of the first, though in milder degree. During her stay in hospital this patient suffered from a low-grade, intermittent fever for about 11 weeks, but she was essentially an ambulatory case throughout the whole illness.

Blood samples, taken from both children at the time of admission, and on several later occasions up to about 10 weeks after the initial bites, yielded pure cultures of *Streptobacillus moniliformis*. Great stress is laid on the need for a concentration of 20 to 30 per cent. serum in the culture medium, to ensure growth of this organism. This was attained by adding 1 ml. of patient's blood to 6 ml. of nutrient broth containing 5 per cent. of human plasma. Many of the failures to isolate *Streptobacillus moniliformis* are probably due to the use of unsatisfactory media.

Agglutinins for this organism varied in titre in the infant's serum between 1 /20 and 1 /80, and reached a titre of 1 /160 in the older child.

Penicillin was administered in treatment, and after each child had received some 2 million units, *Streptobacillus moniliformis* failed to appear in blood cultures. Instead, after the cultures had been incubated for about a week, heavy growths of a pleuropneumonia-like organism developed, and this proved to be the L1 variant of *Streptobacillus moniliformis* described by KLIENEBERGER [*Bulletin of Hygiene*, 1935, v. 10, 351 ; *ibid.*, 1943, v. 18, 422] and KLIENEBERGER-NOBEL [*ibid.*, 1950, v. 25, 172]. Unlike the typical form, this variant is highly resistant to penicillin, and its appearance in these two cases is thought to have been induced by the administration of that drug. For that reason, additional courses of treatment were successively given with aureomycin, streptomycin, and an organic arsenical. No further positive blood cultures were obtained after the course of aureomycin was begun, so the later treatments may have been superfluous. At the time, however, a coincident infection with *Spirillum minus* was suspected, though this conjecture was later rejected.

A survey of the infection-rate of rats in Vancouver with *Spirillum minus* was reported by HUMPHREYS *et al.* [this *Bulletin*, 1950, v. 47, 751] who found the organism present in 27 per cent. of 70 rats examined. Microscopical examinations were therefore made of wet preparations of blood from the patients and from rats trapped in or near their house, and also from guineapigs and mice subinoculated with these bloods. At the outset, *Spirillum minus* was provisionally identified in all, but further experience led to the conclusion that the elements seen were all artefacts. A second possibility of error lay in the

occurrence of filamentous and pseudo-spirillar forms in cultures of *Streptobacillus moniliformis*. If similar types developed in the blood, they also might be mistaken for spirilla.

Many of the animals inoculated with the patients' blood displayed such effects as keratitis, loss of hair, wasting, and irritability, all signs which have been described as occurring in animals infected experimentally with *Spirillum minus*. In the present series, however, *Streptobacillus moniliformis* was isolated in culture from these animals. The same symptoms also developed in a number of mice injected with cultures of that organism.

[The remainder of this interesting article is occupied by a discussion of the relative rôles played by the spirillum and the streptobacillus in the causation of rat-bite fever. The arguments cannot be adequately summarized, and should be consulted in the original. Briefly, however, it may be stated that the authors rather lean towards the view that *Streptobacillus moniliformis* is at least the principal if not the only agent. They consider that there is as yet insufficient evidence to decide definitely whether the spirillum (1) is sometimes present as a secondary parasite modifying the disease process to a limited extent ; (2) is transmitted occasionally, along with the streptobacillus, but acts only as a harmless and transitory commensal ; (3) cannot be transmitted to man by the bite of a rat, its apparent demonstration being merely fallacious.]

J. C. Broom

LEPROSY

Kellersberger, E. R. **The Social Stigma of Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 126–33. [14 refs.]

Rollier, R., Rollier, M. & Petit. Quelques données historiques sur la lèpre en milieu marocain. [**Some Historical Data relating to Leprosy in Morocco.**] *Maroc Med.* 1951, July, v. 30, No. 314, 643–8.

Innes, J. R. **Leprosy in Nyasaland.** *East African Med. J.* 1951, Apr., v. 28, No. 4, 168–73, 1 map.

This is another of the series of leprosy surveys in the countries of East and Central Africa made by Dr. Innes and extensively noted in this *Bulletin*. Surveys were carried out in Nyasaland in 32 different centres giving fair samples of the whole country ; 31,737 people were examined and 444 cases (14 per mille) were found. From this the author calculates that there are roughly 30,000 cases among the 2 million inhabitants. Of the 444 cases " 82 per cent. lived in house contact with children, on an average with 4 children to each case of leprosy. The lack of effective house or village segregation, or institutional segregation to an adequate degree, will keep leprosy hanging round Nyasaland's neck for ever, unless something is done about it." Of the 444 cases found, 22 per cent. were lepromatous, and it is calculated that at this rate there would be 6,600 cases of the infectious type requiring segregation. At present there are six leprosy institutions for about 1,000 cases. The use of the recent new forms of treatment is at a minimum. The author recommends the erection of a new leprosarium for 1,000 patients on a healthy site with low humidity, but remarks that as Nyasaland is a poor country this will be difficult to accomplish without outside help. *Ernest Muir*

HANKS, J. H. **Bacteriology of Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 12–19, 2 figs. [12 refs.]

"The failure of bacteriologists to obtain *in vitro* growth of leprosy bacilli on bacteriological media is adequately explained by Dr. Gray's observations on the inability of these microorganisms to obtain energy from any of the carbon sources ordinarily known to serve this purpose.

"The rapid decline in the viability and the metabolic activity of murine leprosy bacilli, even under the more favorable of the circumstances described, suggests that extremely unfavorable effects are produced by their metabolic limitations when outside of host cells. The nature of this difficulty must be defined, and its cause removed, before there is any reasonable prospect that this type of microorganism can be cultivated on bacteriological media.

"The investigation reported by Prudhomme and the data accumulating in this laboratory indicate that there is a close relationship between the viability or infectiousness of murine type leprosy bacilli and their capacity to transfer hydrogen to an artificial acceptor system. Since Dr. Gray and I have routinely employed portions of the same bacterial suspensions in two types of biochemical work, it can also be stated that the results obtained by measurement of respiration and by dehydrogenation have proven to be in close agreement under the circumstances studied. Additional observations with *M. phlei*, one of the most active of the cultivable mycobacteria, reveal a general correlation between colony counts and endogenous metabolism. There is, therefore, reason to anticipate that the previously tedious and uncertain methods of investigating murine leprosy can be replaced by methods which are rapid and precise. When the validity and the efficiency of these methods have been further substantiated and improved, there should no longer be a complete lack of useful principle or experimental method for the study of human leprosy bacilli."

FITE, G. L. **The Pathology and Pathogenesis of Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 28–33.

CROXATTO, O. C. & CHIRIBOGA, J. **Wolbach and Schaumann Type Inclusions in the Giant Cells in Leprosy. Probable Value in Prognosis.** *Internat. J. Leprosy.* New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 59–62, 4 figs. on pl. [12 refs.]

Two kinds of cytoplasmic inclusion bodies are described. There are those connected with the name of Wolbach, which are star-shaped and occur in giant cells but apparently more in the lepromatous than in the tuberculoid type of leprosy. A suggestion is quoted that "these bodies result from the digestion and incomplete lysis of endocapillary bacillary emboli, and that they evidence organic defence against the leprosy infection". The other inclusion bodies are connected with the name Schaumann. These are spherical or oval, often with concentric laminations, and occur chiefly in sarcoidosis and leprosy. Schaumann's idea was that they may represent tissue reaction round non-bacillary forms of the tubercle bacillus. The authors, after examining 339 histological specimens from 300 cases of leprosy, found 2 Wolbach bodies in 2 lepromatous cases, 2 Schaumann bodies in 2 lepromatous cases and 2 of the same in 2 tuberculoid cases. They suggest that the appearance of the asteroid (Wolbach) bodies in cases in which lipoid necrosis is found with reactional granulomas might indicate a reaction of the lipoids, and believe it is of prognostic value. Clear photomicrographs are given of these bodies.

Ernest Muir

Uyguanco, Maria L. G., Rodriguez, J. N. & Concepcion, Isabelo. **Studies on the Biochemistry of Leprosy : 1. Blood Chemistry in Different Stages of the Disease ; 2. Effect of Promin, Diamidin and Diasone on the Blood Chemistry.** *J. Philippine Med. Ass.* 1950, Feb., v. 26, No. 2, 65–73.

The authors failed to find any mention in literature of the changes in the total protein and globulin in the various types and stages of leprosy, nor could they find any record of the effects of sulphones on these changes. Examining 117 leprosy patients and 18 controls taken from the healthy staff, they found that among the controls the albumin-globulin ratio was 1·1 to 1, but among the male patients it was 0·59 to 1. The haemoglobin content also accompanied a difference of ratio. Among the controls the albumin-globulin ratio was 1·04 to 1 in those with 12 to 14 gm. of haemoglobin per cent. ; and in those with more than 14 gm. 1·16 to 1. Among the male patients the ratio in those with 12 to 14 gm. was 0·51 to 1, and in those with less than 12 gm. per cent. it was 0·33 to 1. The authors found that the more advanced the disease the higher were the globulin and euglobulin values. But " six months treatment with promin, diamin and diasone reduced most of the protein values, especially the euglobulin, although there were fractions that slightly increased".

Ernest Muir

Soule, M. H. **The Laboratory Diagnosis of Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 34–9.

Kahn, R. L. **Universal Serologic Reaction in Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 40–47, 4 figs.

" 1. The serologic pattern of the universal reaction in lepromatous leprosy is distinctive and different from the pattern noted in certain other diseases (syphilis, yaws, malaria, and tuberculosis). In practice, not all patients with lepromatous leprosy show a distinctive pattern, due, it is believed, to intercurrent diseases, especially syphilis.

" 2. No distinctive serologic pattern has thus far been observed in tuberculoid and non-characteristic leprosy.

" 3. The intensity of precipitation in the universal reaction in patients with lepromatous leprosy is related to the degree of activity of the disease. The intensity of precipitation is low when the activity is at a low level, and it is increased when the activity is moderately increased. The intensity of precipitation is reduced, however, when the activity is markedly increased.

" 4. The universal reaction gives promise to be of value in leprosy, especially as a serologic guide to therapy, provided the universal results are obtained from time to time and correlated with clinical findings."

Ross, Hilary. **Serial Cephalin Flocculation Test in Leprosy. A Preliminary Report.** *Internat. J. Leprosy.* New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 51–7, 4 figs.

The test consists in adding cephalin-cholesterol emulsion to a series of dilutions of patient's sera from 1 : 25 up to 1 : 12,800. Charts of flocculation results are obtained by plotting the degrees of flocculation as ordinates against the serial dilutions as abscissae. Taking 30 healthy people as controls and 398 lepromatous and 27 tuberculoid cases of leprosy, the results divided themselves into 4 patterns : (1) included the 30 controls and 30 patients with bacteriologically negative results, and the degree of flocculation rose from 1 to 4 plus in the first four dilutions and then fell again to 1 plus in the next four dilutions ; (2) in 173 cases of lepromatous leprosy the flocculation rose at once

to 4 in the lowest dilution, but diminished as in the first pattern after the fourth dilution. In pattern (3) with 122 lepromatous cases the flocculation began as in the second but was maintained at 4 plus up to the seventh dilution. In (4) the pattern was more like that in the first except that it rose quicker and fell away more slowly. Repetition of these tests showed that they do not vary from week to week. It is suggested that " the repeated use of this test several times a year may be useful as a guide to therapy and prognosis in the treatment of leprosy, or of concomitant hepatic dysfunction ".

Ernest Muir

GOMEZ ORBANEJA, J. & PUCHOL, J. R. Un caso atípico de lepra forma bipolar, incompleta y alternante. [**An Atypical Case of Leprosy alternating between the Two Polar Types.**] *Internat. J. Leprosy*. New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 29–36, 1 text fig. & 7 figs. on 2 pls. English summary.

The authors describe an exceedingly interesting and instructive case which fluctuated between the different types of leprosy. To begin with the type was definitely tuberculoid with a strongly positive Mitsuda test, and biopsy of the skin showing follicles with epithelioid cells and giant cells of Langhans, and an absence of bacilli. The patient was treated with rongalita and later with Diasone. Seven months later the Mitsuda test (both early and late) had become negative, and examination of the skin at a site next to that of the former biopsy showed compact lepromatous structure, foamy cells of Virchow and abundant bacilli in globi. Three months later biopsy showed the picture of a reacting tuberculoid lesion with epithelioid cells in groups surrounded by lymphocytes, but no giant cells were seen. No bacilli were present. The Mitsuda test had become strongly positive again to the extent of producing necrosis. After another six months of treatment biopsy showed lymphatic infiltration chiefly round the vessels, the picture of the residual " indeterminate " form.

The authors ask if this is a case of the nature described by COCHRANE as the " intermediate form", or may it be described as a tuberculoid case with an atypical reaction which made it temporarily assume a lepromatous phase. They conclude that in any case there appears to have been an oscillation in the immuno-allergic state, changing simultaneously the histological structure and the lepromin reaction. Such a condition is difficult to accommodate in the present classification scheme. The authors do not wish to modify the conception of the two polar types of leprosy, but suggest that our knowledge of the evolution of Hansen's disease might come to be better understood by studying and comparing series of biopsies of patients taken, as in this case, at fairly long intervals.

Ernest Muir

ARNOLD, H. L., Jr. & SLOAN, N. R. **Lucio's Spotted Leprosy (Diffuse Lepromatous Leprosy of Mexico). Report of a Case in Hawaii.** *Internat. J. Leprosy*. New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 23–8, 4 figs. on pl. [10 refs.]

The authors describe a patient whom they diagnosed as having suffered formerly from Lucio's spotted form of leprosy, a form common in Mexico but of which this is the first to be described in Hawaii. The diagnosis was based partly on a record made of this patient in 1937 that " on admission there were numerous pustular blebs about 1 cm. in diameter on the anterior and medial surfaces of both thighs ". In 1946 the patient was re-examined and found to be suffering from a mild diffuse form of lepromatous leprosy, confirmed by examination of biopsy sections and by the fact that there was

destruction of the nasal septum and complete loss of the eyebrows, and eyelashes. The sites of the pustular blebs had left atrophic scars. Serological tests for syphilis were positive and the pustular blebs had formerly yielded promptly to neoarsphenamine. [As pointed out by WADE in an editorial (*Internat. J. Leprosy*, 1949, v. 17, 95) Lucio's form of leprosy and lazarine leprosy, which have often been confused, both have diffuse lesions without nodules, and have pustular blebs with more or less deep ulceration ; but the chief difference is that the former is found in the lepromatous type, and the latter in the tuberculoid type of leprosy.] *Ernest Muir*

SYMMERS, W. St. C. **Sudden Appearance of a Lepromatous Eruption during Prolonged Administration of Stilbestrol in a Case of Unsuspected Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 37–43.

An interesting case is recorded which raises the question of the effects of endocrines in the course of leprosy. The patient had spent most of his life in the West Indies and West Africa, both endemic areas, but showed no signs of the disease until he was 84 years of age. More than one year before he had complained of slight difficulty in micturating, and other urinary symptoms. Examination led to a diagnosis of either prostatitis or cancer of the prostate, and the patient being considered too old to stand a biopsy was put on stilboestrol. After 13 months on stilboestrol, 6 mgm. per day most of the time, a skin eruption occurred with nodules on the arms and legs and a reddish flush on the chest. This was found to be due to leprosy, and the histological appearances of the lepromatous type with closely packed bacilli and globi were demonstrated. Meanwhile the urinary symptoms had entirely cleared up.

The question is discussed whether the stilboestrol might not have been associated with the " sudden clinical manifestation of a hitherto unsuspected infection by *M. leprae* ", and comparison is made with the well-known fact that there are puerperal exacerbations of leprosy. Were these conditions related to a change in endocrine balance ? It is also suggested that the urinary troubles may have been due to lepromatous prostatitis. [Such a cause of urinary obstruction, if it occurs at all, must be exceedingly uncommon even in patients with advanced lepromatous orchitis, and the urinary symptoms would probably have become increased at the time of the skin eruption.] *Ernest Muir*

FLOCH, H., LECUILLER, A. & DESTOMBES, P. Sur le traitement sulfoné de la lèpre. Devenir des sulfones disubstituées dans l'organisme. Mode d'action. [**On the Sulphone Treatment of Leprosy. Transformation of Disubstituted Sulphones in the Body. Mode of Action.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 157–60.

The authors conclude that Promin is excreted in the urine entirely in the form of DDS, and that therefore, given time, all promin injected is changed into DDS in the body. There may, however, be monosubstituted sulphones in the blood as temporary stages in this process of conversion. *Ernest Muir*

FLOCH, H., LECUILLER, A. & DESTOMBES, P. Sur le traitement sulfoné de la lèpre. Devenir de la Succinyl-diamino-diphényl-sulfone, sulfone monosubstituée dans l'organisme. Mode d'action. [**On the Sulphone Treatment of Leprosy. The Conversion of Succinyl-diaminodiphenylsulphone, Monosubstituted Sulphone in the Body.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 161–4.

After trial of succinyl-diaminodiphenylsulphone (1·500F) for two years in 60 patients with leprosy, it is concluded that this sulphone monosubstitute owes its antimycobacterial qualities : (*a*) to its own molecule ; (*b*) to the action

of the DDS which it liberates in the body ; (*c*) to another sulphone product eventually elaborated from the monosubstitute. It was found that 1·500F unchanged is eliminated to the extent of 90 per cent. in the urine and that the amount excreted in the form of DDS or other product is in the region of only 10 per cent. *Ernest Muir*

Floch, H. & Destombes, P. Synergie de sulfones dans la lèpre. (Sulfone-mère et 1·500 F.) [**Synergic Action of Sulphones in Leprosy. (Parent Sulphone and 1500F.)**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 151–6. [11 refs.]

Finding that the minimal dose of parent sulphone (DDS) giving 100 per cent. deaths in mice was 20 mgm. (by injection), and that of the monosubstituted 1500F was 75 mgm., the authors expected that the administration of 10 mgm. of the first along with 37·5 of the latter would have a similar effect. But instead the mortality was only 55 per cent. The authors also consider that clinically the combination is synergic and less toxic than DDS alone, especially in early cases in which reactions are more liable to occur.

Ernest Muir

Lowe, J. **Sundry Experiences in the Chemotherapy of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 15–21.

The author from more extended use of diaminodiphenylsulphone (DDS) has diminished the daily dose from 300 to 200 mgm. He recommends taking six weeks to work up to this maximum dose. He also suggests, as an even safer and no less effective method, giving DDS twice a week instead of daily, the dose being 100 mgm. gradually rising to 500 mgm. twice a week. He mentions two complications of sulphone treatment which he has encountered at Uzuakoli, Nigeria : dermatitis and psychosis. In the former he desensitizes the patient by giving minute doses gradually rising during eight weeks to the usual dose. To do this he dissolves 0·5 gm. of Sulphetrone in 3 ounces of water and, beginning with 1 drachm, gives injections twice a week till in the 4th week 10 drachms are reached. By the 8th week 100 mgm. of DDS are tolerated. Six cases of psychosis are described. From the descriptions given the dosage seems to have been very high, 300 to 400 mgm. a day, and some of the patients appear to have been mentally unstable before treatment began. Apparently the symptoms subsided within a short time of suspending treatment. An attempt was made to prevent leprosy in babies of leprous mothers by giving the mothers DDS. This, however, had to be stopped because the babies turned blue, presumably owing to methaemoglobinaemia.

Para-aminosalicylate was tried in six lepromatous cases, but there was no evidence of beneficial result.

A few active major tuberculoid cases were treated for two or three weeks with streptomycin, 1 gm. per day. In some a definite response was seen within a week " which suggests that streptomycin is more active in leprosy than sulphone ". Further work is being continued with streptomycin.

Ernest Muir

Romero L., A. Dermatosis entre los enfermos de lepra en tratamiento. [**Dermatoses in Leprosy Patients undergoing Treatment.**] *Rev. Méd. Costa Rica.* 1950, Nov., v. 9, No. 199, 266–8.

The English summary appended to the paper is as follows :—

" In more than 200 leprosy patients observed in the Sanatorio de las Mercedes from 1949 to 1950 we found only 16 patients showing dermatosis in the course of treatment due to allergic manifestations :

" 3 cases of the exudative generalized eczematous type due to promin.

" 13 cases (of the exudative eczematous type, of the trichophytoid type and of the dry eczematous type evolving toward lichenification) due to crude hepatic extract."

ERICKSON, P. T. **The Status of Streptomycin and Dihydrostreptomycin in the Treatment of Leprosy.** *Internat. J. Leprosy.* New Orleans. 1951, Jan.–Mar., v. 19, No. 1, 1–14, 10 figs. on 2 pls.

There have been conflicting reports about the use of streptomycin in leprosy, and this very thorough trial at Carville will act as a future guide. A previous trial in ten patients was reported from Carville in 1947 [this *Bulletin*, 1948, 45, 442]. In the present trials 114 patients were treated first with streptomycin, and, when later it became available, with the supposedly less toxic dihydrostreptomycin. The patients were divided into six groups : (1) 11 on streptomycin alone ; (2) 15 in whom streptomycin was added when they ceased to make progress on sulphones alone ; (3) 30 similarly given additional streptomycin because of resistant lesions of the mucous membranes ; (4) 43 put on both drugs because there were eye lesions which failed to yield to sulphones alone ; (5) 11 cases with persistent reactions on sulphones alone ; (6) 4 already on sulphone treatment, because of complicating tuberculosis.

In the first group often " promising signs of regression occurred earlier than they do under promin and diasone therapy ". But streptomycin had to be discontinued owing to toxic symptoms, and two months after the treatment was stopped the lesions became worse again. In groups 2, 3 and 4 there was symptomatic improvement whether in the general condition of the skin or in the mucous membranes or eyes. In the 5th group there did not appear to be any beneficial result. In the 6th group three of the four patients who were able to continue for 90 days showed clearing of skin lesions. The main difficulty with streptomycin in leprosy is that, unlike the sulphones, it cannot be continued over an indefinite period without causing toxic manifestations such as vertigo, tinnitus and loss of hearing, which limits its use to a period of six months. But it is useful in combination with sulphones for hastening the resolution of specific lesions of the skin and mucous membranes when these have reached a stationary stage, for aborting attacks of leprous iridocyclitis and for treating patients who have an idiosyncrasy to sulphones. *Ernest Muir*

CHAUSSINAND, R. & BESSE, P. Inoculation du bacille de Hansen et du bacille de Stefansky à la perche arc-en-ciel (*Eupomotis gibbosus*). Note préliminaire. [**Inoculation of** *Myco. leprae* **and the Stefansky Organism into the Perch.**] *Rev. Brasileira Leprologia.* S. Paulo. 1951, Mar., v. 19, No. 1, 4–7.

These attempts to infect fish were negative.

GRUNBERG, E. & SCHNITZER, R. J. **Chemotherapy of Murine Leprosy.** *Ann. New York Acad. Sci.* 1951, Mar. 30, v. 54, Art. 1, 107–14, 3 figs. [16 refs.]

" A short history of the development of systematic research in experimental chemotherapy of leprosy is given and the infection with *M. leprae murium* is stressed.

" A method for the determination of the activity of chemotherapeutic agents against *M. leprae murium* in mice is described. This method is based on the inhibition of multiplication of the bacteria rather than the growth of lesions, which seems to be independent of the number of organisms present.

" It might be disappointing to hear that no new drug with striking activity in this chronic infection has been found experimentally and that this paper

offers more technical information than real chemotherapeutic results. We are, however, under the impression that systematic work, with the aid of a suitable technic, might eventually lead to findings of a more promising nature."

HELMINTHIASIS

HOEPPLI, R. **Some Rare Forms of Human Parasitic Infection of Interset to the Physician in China.** *Chinese Med. J.* Shanghai. 1950, July–Aug., v. 68, Nos. 7/8, 221–38. [86 refs.]

A review and discussion.

SCHWETZ, J. Sur le problème actuel des bilharzioses humaines au Congo Belge. [**The Present Problem of Human Schistosomiasis in the Belgian Congo.**] *Bull. Soc. Path. Exot.* 1951, v. 44, Nos. 3/4, 195–202.

[The researches and published works of this author in recent years have placed him in the front ranks of investigators of bilharziasis, and his realistic approach to the subject and logical treatment of some of its more recondite aspects have a strong appeal both to the scientist and sanitarian. The present paper, which is in reality a résumé and commentary on current knowledge of the epidemiology of the disease in Belgian Congo, much of which also concerns other parts of Africa, is therefore of great interest.]

I. *On the molluscan hosts of African schistosomiasis*

Under this heading is a brief account in which *Pyrgophysa* (=*Bulinus*) *forskali* is dismissed as an unimportant agent in the transmission of *S. haematobium*, which in Egypt is carried by *Bulinus* and in central Africa by *Physopsis*. There is only one species of *Physopsis*, *P. africana*, all the other "species" which have been named are merely varieties and equally good hosts. All the African species of *Planorbis* are hosts of *S. mansoni*.

II. *Current knowledge of the aetiology and transmission of human African schistosomiasis*

The fundamental principles of the aetiology, and the possible divergences from them which may occur, are stated and discussed. Observations are made on the distribution of intestinal and vesicular schistosomiasis in the Belgian Congo, and on the presence of an intestinal form which produces eggs with terminal spines. The validity of this species, *S. intercalatum* Fisher, 1934, is upheld.

III. *The epidemiology of human schistosomiasis in the Belgian Congo*

Formerly, the disease in the Belgian Congo, and in Africa generally, was probably limited to circumscribed and infrequent foci which gradually became larger and more widely distributed by human agency, increasing human occupation of the country and industrialization. The chief offenders in this respect are fisheries and mining activities ; agricultural development necessitating irrigation schemes and cotton planting are also concerned. More recently the fairly widespread construction of fish ponds is bound to worsen the situation.

The gravity of the disease varies from place to place, and is usually greatest in men, while women, in whom the incidence is the same, are not so seriously affected.

IV. *Distribution of the different forms of schistosomiasis in the Belgian Congo*

Regions and localities may be infected with either vesicular or intestinal schistosomiasis exclusively, or with both together. As a general rule the latter form is the more common, owing partly to the fact that *Planorbis* is commoner than *Physopsis ;* but in some places where *Physopsis* is equally plentiful, no vesicular schistosomiasis is present. Broadly speaking, on the eastern border, from Uele-Ituri to south of lake Tanganyika, there is only intestinal infection. In the great lakes of this region, Lakes Albert, Edward, Kivu and Tanganyika, *Physopsis* is not found but is common enough in the rivers and streams. Both forms of the disease are common in the Katanga province in the south-east, and are often present in the same person. In Lower Congo, there are isolated foci containing one or the other form of the disease.

V. *Prevention of schistosomiasis in the Belgian Congo*

An evaluation is made of the three main lines of approach, treatment, hygiene and snail destruction. The ideal one, snail control, is impracticable for the vast areas involved. Similar difficulties attend the institution of hygienic measures for control, such as the construction of latrines. Prophylactic treatment is the most feasible line of approach and for this an effective drug is required, which must be administered to every infected person. But as a preliminary the whole population must be examined.

It is evident that the war against schistosomiasis in the Belgian Congo is no simple matter [nor is it so in any country for that matter] and its strategy should be adapted to local conditions. Total war is impossible and a beginning should be made in the worst endemic foci in which the aim should be complete eradication, not merely palliation. The lessons learned in such an effort would be invaluable ultimately for attacking the problem in other foci.

" We pass over in silence a prophylaxis, recently advocated which involves the minimum of effort and is so fashionable nowadays—propaganda. It consists of explaining to the people the dangers of going near the water. This prophylaxis of the distant future is not only valueless for the present generation but is quite absurd ; just where are the people going to draw water to wash themselves and their clothes ? Enough said ! " *J. J. C. Buckley*

Schwetz, J. Sur la bilharziose à la Mission et à l'école professionnelle des Salésiens de la Kafubu. [**Schistosomiasis at the Mission and School of Kafubu.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Feb. 28, v. 31, No. 1, 103–9.

The following is a free translation of the author's summary in French :—

The Salesian vocational Mission and School of Kafubu is an old focus of vesicular and intestinal schistosomiasis. As far back as 1931, Staudt found, in 171 examined there, 29·14 per cent. with vesicular and 9·14 per cent. with intestinal schistosomiasis. In 1934, Van den Berghe found, in 183 persons there, an incidence of 40 per cent. and 8 per cent., respectively. In 1950 we found 30 per cent. of 41 to be infected with vesicular, and 22·32 per cent. of 112, with intestinal schistosomiasis. The disease incidence therefore seems to remain more or less stationary at this place.

Planorbis and *Physopsis* are very numerous in the different canals and drains which run through the Mission land and especially in the two fish ponds. Infected specimens of both *Planorbis* and *Physopsis* were found.

J. J. C. Buckley

SCHWETZ, J. Recherches sur la bilharziose dans l'agglomération d'Elisabethville. [**Investigations on Schistosomiasis round Elizabethville.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Feb. 28, v. 31, No. 1, 71–92, 1 folding map, 16 figs. (13 on 4 pls.)

The following is a free translation of the author's summary in French.

The investigations revealed :—

1. That the snail hosts of schistosomiasis, *Planorbis* and *Physopsis*, are present in practically all the water courses in the Elizabethville centre and its environs.

2. That these snails are particularly abundant in artificial water reservoirs, such as canals, drains and ponds and that they will become more and more abundant with the increased development of such water reservoirs.

3. That infected *Physopsis* have not yet been found but infected *Planorbis* were found in several places in the town, notably in Keyberg which is highly infested.

4. That as the number of Africans coming from various parts of the Congo increases, the number of infected snail habitats will also increase and these in turn will infect more Africans, and indirectly, more Europeans.

5. That neither the percentage of the population which is infected nor its intensity is known.

6. That examination of two groups of Africans revealed an infection rate of 30 to 40 per cent. and that the infection did not appear to be serious, but even a light infection may become worse in the absence of medical supervision.

7. That only intestinal schistosomiasis seems so far to occur at Elizabethville and Keyberg, which explains why hitherto no infected *Physopsis* have been found.

J. J. C. Buckley

SCHWETZ, J. Note préliminaire sur la bilharziose à Sakania (Katanga, Congo Belge). [**Preliminary Note on Schistosomiasis in Sakania, Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Feb. 28, v. 31, No. 1, 93–102, 1 map.

The following is a free translation of the author's summary in French.

Sakania is an old focus of schistosomiasis where the vesicular form is markedly predominant. As far back as 1933, the doctor at Sakania mentioned it in his report and emphasized the gravity of the situation, which was reiterated in the 1938 and 1939 reports. Having found no further information about schistosomiasis in Sakania since 1939, we took the opportunity, whilst at Elizabethville, of going to see what was the present situation. This is what we found : Sakania is situated at the beginning of the small river Lubembe. Both the river itself and its sources are heavily populated with *Planorbis* and *Physopsis*. We found vesicular schistosomiasis not only in several persons who came with specific complaints, but also in about 10 Africans who came for quite different reasons (sores, ulcers, etc.).

As the African population is very sparse round Sakania, and as, on the other hand, there is only one small river, we believe that it would be possible to get rid of schistosomiasis by combined action consisting of systematic examination of the population, systematic treatment of infections and destruction of snails.

J. J. C. Buckley

Barlow, C. H. & Muench, H. **Life Span and Monthly Mortality Rate of *Bulinus truncatus* and *Planorbis boissyi*, the Intermediate Hosts of Schistosomiasis in Egypt.** *J. Parasitology.* 1951, Apr., v. 37, No. 2, 165–73, 4 figs.

"Since the snails *Bulinus truncatus* and *Planorbis boissyi*, when lightly infected with *Schistosoma haematobium*, resp. *S. mansoni*, may carry their infections for the remainder of their lives, their respective life spans are of practical as well as scientific interest. A method was devised whereby snails of a given hatch might be counted monthly and deaths recorded until the last snail had died.

"Life table functions were obtained for each of four groups of snails, two of *B. truncatus* and two of *P. boissyi*. These functions indicate that 'infant mortality' was high for all groups, that mortality dropped to a low point when snails were about eight months old and then rose sharply. The life span of *B. truncatus* was 14 months, while that of *P. boissyi* was five months longer. *P. boissyi*, when infected, may therefore serve as disseminator of schistosome larvae over a longer period than does *B. truncatus*.

"The average age-size relationship of each group was determined and a size scale was made for further measurement values."

Mozley, Alan. **The Snail Hosts of Bilharzia in Africa.**

This book is reviewed on p. 1055.

Watson, J. M., Pringle, G. & Jamil, A. K. **Clinical Investigations on the Treatment of Urinary Bilharziasis. Part II. Miracil D.** *J. Trop. Med. & Hyg.* 1951, July, v. 54, No. 7, 137–43, 1 chart. [18 refs.]

The authors have already given an account of the treatment of urinary bilharziasis with sodium antimony gluconate [this *Bulletin*, 1951, v. 48, 480]. This is a record of the treatment with enteric-coated tablets of Nilodin (miracil D) of 25 prisoner patients with *Schistosoma haematobium* infestations. All were males who, with a single exception, were serving long sentences ; the possibility of reinfections and the difficulties in follow-up were therefore obviated. The presence of an undisclosed but maturing infection at the time of treatment was also eliminated, as all the patients had already been confined not less than three months.

The total dosage of a course of Nilodin treatment was 100 mgm. per kgm. ; this was divided into 10 doses over 5 days. Marked diminution of the clinical evidence of bilharziasis followed the treatment. A specimen of urine was collected daily after exercise for microscopical examination throughout treatment and for a month afterwards ; the urine was then examined weekly for another two months. [Urine examination alone was used in the determination of "cure".] As shown in a histogram, the total numbers of ova in the urine were found to drop very markedly by the third week, and the ratio of living to dead eggs was greatly reduced after this time. Nineteen of the 25 patients had ceased to pass viable eggs by the 19th day of treatment ; all these remained free from them during the follow-up period. Five of the 6 remaining cases continued irregularly to pass viable eggs beyond the maximum period of observation recommended by Blair *et al.* [this *Bulletin*, 1949, v. 46, 848], but ceased to do so between the 36th and 57th days after the treatment had ended. The 6th, and last, patient was the most heavily infected of all ; he continued to pass viable eggs throughout observation though in reduced numbers ; but his clinical condition was much improved.

Every patient treated complained of one or more side-effects of the treatment. Headache was the most prevalent complaint, and one which has not received mention by others who have recorded the toxic effects of Miracil D. The authors consider Nilodin an efficient bilharzicide, but think that it is unlikely to become popular with patients in view of its unpleasant reactions, and it is unsuitable for mass treatment both because of this and on account of its expense. *A. R. D. Adams*

NEWSOME, J. **Recent Investigations into the Treatment of Schistosomiasis by Miracil D in Egypt.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 611–24. Discussion 624–34 [FAIRLEY, N. H. ; BOYD, J. S. K. ; STANDEN, O. D. ; WALKER, J. ; SHARP, T. M. ; CHESTERMAN, C. C. ; GORDON, R. M. ; ADAMS, A. R. D. ; LE ROUX, P. L. ; NEWSOME, J. (in reply)].

This is an account of the work done in Egypt between 1947 and 1950 by the Bilharzia Unit of the Medical Research Council. Some of the results of the work have already been published [this *Bulletin*, 1951, v. 48, 48].

Attempts were made to lessen or to obviate the very undesirable side effects of Miracil D treatment, which are particularly obtrusive in Egyptian patients. The salt originally employed was Miracil D hydrochloride. Modifications of Miracil D which were tried included (1) sugar and enteric coating of tablets of the hydrochloride, (2) the use of Miracil D methylene bis-hydroxynaphthoate, and (3) of Miracil D salicylate. Enteric coating of Miracil D hydrochloride tablets, though it lessened the side effects of the drug, proved an unsatisfactory solution of the problem, since much of the drug was then passed unabsorbed in the faeces of patients suffering from *Schistosoma mansoni* infections. The methylene bis-hydroxynaphthoate salt is very sparingly soluble and it is tasteless ; it contains only about two-thirds of the base in an equivalent weight of the hydrochloride. Though its use achieved a satisfactory diminution of the toxic side-effects, the insolubility of the salt resulted in much of it being voided unabsorbed in the stools, and its therapeutic efficacy correspondingly suffered. The salicylate salt, which is intermediate in solubility between the hydrochloride and the naphthoate, also gave an encouraging reduction in toxic side-effects although it was found to be adequately absorbed and was effective. The salicylate promises to be the most satisfactory of the Miracil D preparations so far used ; it is suggested that it might be further improved by incorporation in enteric-coated tablets.

Patients with *S. mansoni* infection, some of whom also harboured *S. haematobium*, were treated with Miracil D hydrochloride. The examinations to determine if these patients were sterilized of their infections further emphasized the difficulties in the detection of an active schistosomal infection. The supreme importance of the adoption of standard, reasonably accurate, procedures for determining whether cure has followed a drug treatment is obvious. Three procedures were employed ; these were all simple to operate and readily applicable in the laboratories of small hospitals. It was found that the systematic use of these three as a routine gave results much superior to that of any one procedure used alone. The methods were (1) microscopy of urine and of faeces ; (2) hatching of eggs in large samples of urine and of faeces, with visual search for miracidia in the neck of a flask directly or by projected enlargement on to a screen ; (3) rectal biopsy. Information on the detailed performance of these operations should be sought in the original.

It was noticed that miracidia of *S. mansoni* are repelled by a direct light source, but are attracted to a brightly lit surface, such as a cork or the underside of a meniscus. A simple and effective method of obtaining material for

biopsy from the rectum was the use of a Coldlite child-size proctoscope and a small sharp scoop [or an external auditory metal curette] ; the scoop was used to trap a piece of tissue and to cut it off against the edge of the proctoscope. A fragment of 2 by 2 by 1 mm. was the objective ; if a piece smaller than this was obtained another was taken ; such specimens from the anterior and also from the posterior walls of the rectum were habitually examined. The pieces of tissue were put in about 1 cc. of tap water ; within half an hour they became soft ; they were then examined after squeezing between two slides in watery eosin, or, after teasing with needles, under a coverslip. The eosin solution was used merely to afford rest for the eye when dealing with many specimens ; the light passing through the condenser should be reduced, to the same end. *S. mansoni* eggs were usually scanty and were found lying in chains along vessels ; *S. haematobium* eggs were often very numerous, and they lay in clumps deep in the mucosa.

The systematic application of these tests yielded some unexpected findings. Rectal biopsy of 95 prisoners showed that 23 of these harboured *S. haematobium*, and only 2 of them *S. mansoni* ; the urines of these men did not yield ova, nor did they yield miracidia on a hatching test. Their vesical *haematobium* infections would appear to have become clinically cured although numerous live worms persisted in the rectal mucosa without causing symptoms. This " negative urine, positive rectum " condition in *S. haematobium* endemic areas was found to be common both in old and in young men ; 89·5 per cent. of patients found, by all three techniques, to be harbouring *S. haematobium* infections yielded living ova on rectal biopsy. The systematic routine application of these three techniques showed that cures, both of *S. mansoni* and of *S. haematobium* infections, by specific treatment, were markedly less than more perfunctory investigations would suggest. This doubtless explains the many contradictions in the reported results of various treatments for bilharziasis.

Finally, in relation to specific treatment, where bilharziasis is prevalent its incidence in the population is often so high that it is not administratively possible to eradicate the infection in every case. Members of a community continuously at risk are less troubled than persons on first infection by a few worms persisting after treatment. It should be the aim to cure completely any patient from outside an endemic area who is suffering from a first attack. Attempts should also be made to sterilize patients suffering from severe manifestations, particularly of an *S. mansoni* infection, although the bulk of the population must rest content with only clinical relief.

A. R. D. Adams

Schwetz, J. **Schistosomiasis at Lake Bunyonyi, Kigesi District, Uganda. (Altitude 6,300 Feet above Sea Level.)** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 515–20, 2 maps in text.

" In two widely separated places of Lake Bunyonyi at Chabahinga, near Kabale, and in Muko, we found the same three species of fresh water snails :

" (1) *Pl. pfeifferi* Krauss.

" (2) *B. coulboisi* Bourg. and *B. mutandaensis* Preston.

" (3) *L. natalensis* (*undussumae*) von Martens.

" *Bulinus* were the most abundant, *Planorbis* also numerous, and *Lymnaea* comparatively rare.

" Amongst the *Planorbis* (and *Bulinus*) of Chabahinga we found none infected with *Schistosoma* cercariae, but amongst the *Planorbis* at Muko we found two specimens shedding *Schistosoma* cercariae. Both *Planorbis* died before we had time to try an animal experiment.

" We did not examine the natives of Muko, but amongst those of Chabahinga, near Kabale, we found a few boys infected with *S. mansoni*. Infection, however, was very light, and none of the affected complained of any symptoms.

" *S. mansoni* thus exists at an altitude of 6,300 feet."

STIREWALT, M. A. **The Frequency of Bisexual Infections of *Schistosoma mansoni* in Snails of the Species *Australorbis glabratus* (Say).** *J. Parasitology.* 1951, Feb., v. 37, No. 1, 42–7. [10 refs.]

" The sex of infections of *Schistosoma mansoni* developing in *Australorbis glabratus* from exposures of individual snails to 1, 2, 3, 4, 5, 10, and 20 miracidia each has been observed upon the recovery of the schistosomes maturing in mice from the cercariae from these snails.

" 1. Many individual *A. glabratus*, perhaps of a resistant genetic strain, were found to be refractory to this strain of *S. mansoni*.

" 2. Unisexual infections of schistosomes resulted from exposures of one miracidium per snail ; bisexual infections from 2, 3, 4, 5, and 10 miracidia varied from 28 to 52 per cent of the total infections ; while 76 per cent of the infections from 20 miracidia were bisexual.

" 3. Summated unisexual infections were about equally divided between male and females.

" 4. The proportion of bisexual infections among susceptible snails, indicating the maturation of at least one miracidium of each sex per snail, was lower than that to be expected on the basis of an ' attraction ' of the molluscs for the miracidia and the uninhibited development of the latter after penetration. It is suggested that perhaps the contact of these miracidia with the soft tissues of the snail is a chance phenomenon."

MALDONADO, J. F., ACOSTA-MATIENZO, Josefina & VÉLEZ-HERRERA, F. **Biological Studies on the Miracidium of *Schistosoma mansoni*. Part 4. The Role of pH in Hatching and Longevity.** *Puerto Rico J. Pub. Health & Trop. Med.* 1950, Sept., v. 26, No. 1, 85–91. [Spanish version 92–9.]

" Ingalls and co-workers reported best miracidial yields of *S. japonicum* in natural river waters slightly on the alkaline side (pH 7·2–7·6). They also found that even a slight change toward the acid side (pH 6·8–6·4) was enough to cause a significant reduction of hatching power in this species.

" The present investigations appear to demonstrate that the eggs of *S. mansoni* differ from those of its closely related species in that their hatchability is not affected through a rather wide range of hydrogen-ion activity (pH 5·16–8·35). If the hydrogen-ion concentration were to interfere with the hatching process in this species, wider pH deviations than the ones described here or those normally observed in natural river waters would be involved.

" On the other hand, the free-swimming miracidium of *S. mansoni* was found to be highly sensitive to changes in hydrogen-ion activity. A medium on the acid side (pH 5–6) undoubtedly curtails the life of the larva ; a neutral medium, or one slightly on the alkaline side (pH 7–8), is fairly satisfactory ; one initially further on the alkaline side (pH 8–9) allows for maximum longevity.

" The present data also demonstrate that the Theriault-Nichols dilution water constitutes a favorable experimental medium for *S. mansoni* miracidia."

Le Poole, A. **Observations on Cases of Schistosomiasis mansoni in a Non-Endemic Area (Aruba, N.W.I.).** *Amer. J. Trop. Med.* 1951, May, v. 31, No. 3, 346–54. [11 refs.]

Curaçao and Aruba are islands in the Netherlands West Indies. For some years they have steadily grown in importance as oil refining centres. No autochthonous case of *Schistosoma mansoni* infection has been recorded in Aruba, and no recognized snail vector of the parasite has been found in the island. Many of the islands in the Caribbean Sea, which supply labour to Aruba, are centres of schistosome infection. Many immigrants to Aruba from these islands harbour parasites, including *S. mansoni*. This paper gives an account of chronic *S. mansoni* infections, in the absence of possible reinfection, detected in 100 such immigrants of either sex. It is worth noting that the majority of these persons had passed a physical examination before employment, though a special search for *S. mansoni* infection had no part in it. The individuals were drawn from a very wide range of racial types, and were adolescents or adults of working age ; there were no very young or aged. In 75 per cent. of the cases the diagnosis of schistosomiasis was made within 3 years of arrival at Aruba, and in the vast majority of these it was established within 6 months of their arrival. In only 3 per cent. of cases did any possibility of a reinfection arise during vacation from the island.

Diagnosis in every case was established by recovery of the eggs ; in 64 cases by simple stool examination ; in 30 by rectal biopsy ; in 2 by rectal swab ; in 3 by an acid-ether stool concentration ; and in one by biopsy of a nodule in the colon. None of the patients was able to give an adequate account of the invasive period of the infection. In 32 cases the ova were found incidentally on physical examination for other disorders ; the other 68 patients complained of intestinal disorders. The latter commonly were cramp-like pains, with frequent stools of normal consistency ; occasionally the stools contained some blood and mucus ; rarely they were dysenteric in appearance. Most of the 24 female patients complained of gynaecological disorders. In 13 patients there was moderate liver enlargement ; in 12 there was splenic enlargement ; and in 23 there was enlargement of both liver and spleen, 5 of these patients suffered from the Banti syndrome. Anaemia was not a characteristic of the infection ; the white count was usually low and ranged from about 2,000 to 5,500 cells per cmm. ; the eosinophile percentage was from 3 to 14 but 15 patients constantly had normal eosinophile counts.

The conclusion is " that schistosomiasis in patients not subjected to reinfection, and living under favorable conditions is a non-progressive relatively mild condition ". *A. R. D. Adams*

Le Poole, A. **Hypersplenism in Patients infected with *Schistosoma mansoni*.** *Documenta Neerlandica et Indonesica de Morbis Tropicis.* Amsterdam. 1951, June, v. 3, No. 2, 181–5. [21 refs.]

The author has already published an account of chronic *Schistosoma mansoni* infections as seen in 100 immigrants into Aruba, one of the Netherlands Antilles [see above]. [It may be recalled that there is no indigenous schistosomiasis in the island.] In this paper are recorded the findings in three of these Creole patients with gross enlargements of the liver and of the spleen, and cellular abnormalities in the blood ; the signs and symptoms were those of the Banti syndrome in association with *S. mansoni* infections.

The first patient was a woman 32 years old delivered of twins, who had a red cell count of 3·7 million and a haemoglobin value of 62 per cent. ; the eucocyte count was 1,500 ; the platelet count 54,000. Eighty per cent. of the

red cells sickled ; reticulocytes represented 1·8 per cent. of the total count. A spleen weighing 920 gm. was removed at operation ; at the same time material was taken from the liver for biopsy. The blood picture after the operation showed an increase in leucocytes and thrombocytes, but no changes in the red cell count or haemoglobin value.

The second patient was a man of 25 years, who was suffering from acute amoebic dysentery. His red cells totalled 3·9 million, and the haemoglobin value was 78 per cent. ; the leucocyte count was 2,950 ; the platelet count was 84,000. Over 95 per cent. of the red cells were ovalocytes ; there was no sickling. After the amoebic dysenteric attack had been controlled the patient was treated with fuadin. A year later the physical signs and blood picture were substantially the same.

A third patient, a man of 22, was in hospital for tonsillectomy. Two years later the enlargements of the liver and spleen had not varied. At this time the red cell count totalled 5·9 million, and the haemoglobin value was 106 per cent. ; the leucocyte count was 3,000 ; the platelet count was 77,000. The patient vanished before full investigations could be carried out.

There is apparently a direct connexion between schistosomal infection and the development of hepato-splenomegaly with haematological evidence of hypersplenism. The intensity of the individual schistosomal infections observed in a series of cases seemed to bear no relation to the tendency to develop the Banti syndrome. The actual mechanism of the production of this complication is not clear.

[Details of tests for liver function, marrow activity, blood coagulation times, clot retraction, and of many other investigations, should be sought in the original.] *A. R. D. Adams*

MEIRA, J. A., BEHMER, O. A. & BLOISE, W. Endarterite pulmonar esquistosomótica. A propósito de um caso com comprovação necroscópica. [**A Case of Schistosomal Pulmonary Endarteritis Identified at Autopsy.**] Reprinted from *Rev. Med. e Cirurg. de São Paulo.* 1951, Apr., v. 11, No. 4, 169–78, 6 figs. [18 refs.]

The English summary appended to the paper is as follows :—

" The authors present the report about a young woman from the State of Alagoas, 24 years old, intensively infected by *Schistosoma mansoni* ; she went to the ' Hospital das Clínicas ' with heart failure in the terminal period.

" The etiological diagnostic was not made when the patient was alive and the clinical studies could not be completely made because the patient was very ill ; she died few days after her admission in the hospital. The necropsy showed severe hepatic lesions determined by Manson's Schistosomiasis (hepatic cirrhosis and congestive splenomegaly) and it was observed that the heart failure was due to schistosomal chronic cor pulmonale.

" The authors made some comments about this case and mentioned the recent literature."

RAPER, A. B. *Schistosoma bovis* **Infection in Man.** *East African Med. J.* 1951, Feb., v. 28, No. 2, 50–54, 2 figs. on pl. [16 refs.]

Spindle-shaped eggs with terminal spines, identified as those of *Schistosoma bovis* were found in the stool of a medical officer who had bathed in a swimming pool about a month previously, after which a skin rash had appeared, consisting of itching papules on the lower neck, chest, axillary folds and arms. A few

days before the finding of the eggs, symptoms of tiredness, aching thighs and trembling hands were experienced. Abdominal pain and nausea occurred the day before the stool was examined. There was no diarrhoea. The leucocyte count that day was 10,400 per cmm. with neutrophiles 58 per cent., eosinophiles 7 per cent., basophiles 2 per cent., lymphocytes 28 per cent. and monocytes 5 per cent. The symptoms were transient and subsequent examination of the stools were negative. There were no urinary symptoms and no eggs were found in the urine over a period of three days after the first stool examination.

The measurements of the eggs, which satisfy Alves's criteria for the identification of *S. bovis* [this *Bulletin*, 1950, v. 47, 375], and their appearance, leave little doubt that this is an authentic and hence very interesting case of human infection with this species.

The source of the cercarial infection was apparently from snails, which were numerous on the lake shore (Lake Victoria) near the intake pipe which supplied the swimming pool with water. Cattle faeces could have contaminated the water about 100 yards from the intake pipe and this would explain the molluscan infection.

The author comments on the transient, almost symptomless nature of the infection, which would probably have escaped detection if it had not occurred in a medical man, and if it is typical of pure *S. bovis* infection, would explain why this has not been observed with certainty hitherto. Previous attempts to infect man experimentally with *S. bovis* have been few, unsuccessful and inconclusive ; the author's further investigation on these lines may yield results of interest and practical value. *J. J. C. Buckley*

SCHWETZ, J. **On Vesical Bilharzia in the Lango District (Uganda).** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Apr., v. 44, No. 5, 501–14, 1 sketch map & 5 figs, on 2 pls.

" With the *S. bovis* eggs from our mouse N.4 (fifth experiment), infected by cercariae from four *Ph. nasuta* (Uganda), we succeeded in infecting by two different methods two *Ph. africana* bred in the laboratory from a stock brought from the region of Stanleyville (Belgian Congo).

" Setting aside the well-known difficulty of infecting *Physopsis*, our experiment demonstrates the fact that both *Ph. nasuta* and *Ph. africana* can replace one another, at least in the transmission of *S. bovis*.

" From the malacological point of view it seems that *Ph. nasuta*, which morphologically is certainly more distinct from *Ph. africana* than all the other *Physopsis* described, is nevertheless not a true species but only a simple variety of the type *Physopsis* (notably *Ph. africana*).

" We have already tried to infect mice with the cercariae of our two infected *Ph. africana*, and the result will be given in a later note."

LAGRANGE, E. & SCHEECQMANS, G. La pratique de la bilharziose expérimentale. [**The Practice of Experimental Schistosomiasis.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 193–206. [12 refs.]

The authors give a general account of experimental schistosomiasis and describe some points of particular interest based on their four years' experience of laboratory transmission of *S. mansoni*, during which 900 snails, 1,200 mice and other small mammals were handled. The infection was passaged 11 times, each passage consisting of one complete life-cycle.

The snail hosts they employed were *Planorbis glabratus* and these were kept in " balanced " aquaria according to a modified version of the method described by STANDEN [this *Bulletin*, 1949, v. 46, 946]. This is described

together with observations on snail growth and breeding. For infecting snails, eggs of *S. mansoni* were obtained from mouse faeces or ground up mouse liver. A fairly detailed account follows, which cannot easily be summarized, of the step-by-step procedure of exposing snails to infection, the diagnosis of infection in the snails, the collecting and counting of cercariae, the exposure of mice to infection and the nature and duration of the molluscan infection. Continuing in this vein, the authors describe the adult infection in mice, and a number of interesting observations are made on this phase relating to the biology, pathology, chemotherapy and symptomatology of the infection. Although somewhat diffuse and lacking appropriate headings, this paper is of value and should be read carefully by research workers or intending workers on the subject, who will appreciate in particular the descriptions of methods of procedure which are of such importance in prosecuting research of this kind.

J. J. C. Buckley

LAGRANGE, E. & SCHEECQMANS, G. Sur l'épidémiologie de la bilharziose expérimentale à *B. mansoni*. [**The Epizoology of Experimental** *Schistosoma mansoni* **Infections.**] *C. R. Soc. Biol.* 1950, Dec., v. 144, Nos. 23/24, 1703–5.

In the maintenance of a strain of *S. mansoni* in laboratory animals it was observed that the molluscan infestation is sometimes characterized by either the death of the snail or by a much reduced period of infection during which very small numbers of cercariae are discharged. In some of the abortive infections, numerous active cercariae were found when the living or dead snails were dissected. It is thought that a proper understanding of the factors concerned in bringing about these abnormal kinds of molluscan infections, which may also possibly occur in the field, might be of value in the control of bilharziasis.

J. J. C. Buckley

PAN, C. & HUNTER, G. W. **A Modified Perfusion Technique for the Recovery of Schistosomes.** *J. Lab. & Clin. Med.* 1951, May, v. 37, No. 5, 815–16, 1 fig.

This technique is a modification of that described by YOLLES *et al.* [this *Bulletin*, 1948, v. 45, 349] and is reported to be excellent for the recovery of immature as well as mature worms. With experience, it occupies 1–1½ hours, including the recovery of all the worms. The apparatus is illustrated. The procedure is as follows :—

1. Fill a 1 or 2 gallon aspirating bottle with physiological saline (0·85 per cent.).
2. Use a 100 ml. syringe as a source of pressure.
3. Connect the syringe to the stem of a T tube which is connected to the aspirating bottle (with a stopcock) through one arm and to the needle through the other. Use a 22-gauge needle for mice, and a 19-gauge needle for hamsters.
4. Open the stopcock to fill the syringe and then close it to prevent back flow.
5. Anaesthetize the animal with ether, open the abdominal cavity, and ligate the following : (*a*) inferior vena cava close to the heart, (*b*) oesophagus, (*c*) the arch of the aorta to the vertebral column, (*d*) femoral artery, and (*e*) femoral vein to the femur, (*f*) sacral artery, and (*g*) sacral vein to the vertebral column, (*h*) portal vein, (*i*) rectum.
6. After the ligations are completed, cut the backbone above the ligature on the aorta and below the sacral artery and then through the leg (including the femur).

7. Separate the backbone and attached organs from the skin and transfer to a Petri dish filled with physiological saline.

8. Cut the portal vein below the ligature and insert the needle in the aorta, tying it firmly to the backbone so that it will not slip. Then perfuse through the aorta to bring out the worms located in the mesenteric vessels.

9. Now cut the portal vein on the liver side of the ligature and perfuse the liver by inserting the needle in the sinus of the liver. *J. J. C. Buckley*

LAGRANGE, E. A propos de la prophylaxie de la Bilharziose. [**The Prophylaxis of Schistosomiasis.**] *Ann. Soc. Belge. de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 179–92. [15 refs.]

The English summary appended to the paper is as follows :—

"The author considers the literature about the destruction of snails and describes his personal contributions, performed in Europe :

"—two quaternary ammonium germicides, Cetavlon and Zephirol, kill snails cercariae and fishes as well at 10^{-5}.

"—the oligodynamic action of copper is really specific for pulmonate snails, inactive against cercariae and fishes.

"—ultra-sounds, to which snails and cercariae are very susceptible, fishes and frogs much less.

"He shows, namely after the Venezuelian school, that cercariae escaping from snails can be driven away by the current and infect men at some distance.

"He also shows how prophylaxis must be adapted to the local conditions and that there is no general and abstract principle for the activity of the hygienist working on the field."

LAGRANGE, E., SCHEECQMANS, G. & SARKISSIAN, M. Recherches expérimentales sur les poisons anti-Mollusques. [**Experiments with Snail Poisons.**] *C. R. Soc. Biol.* 1950, Dec., v. 144, Nos. 23/24, 1705–7.

Of 185 chemical compounds tested against *Australorbis glabratus* special attention was given to certain wetting agents, two of which showed high toxicity to the snails. These were zephirol (dimethyl alkylbenzylammonium chloride) and cetavlon (cetyltrimethylammonium bromide) which cause retraction and immbolization of the snail in 30 minutes at a dilution of 10^{-5}, and kill them in less than 24 hours. They are also very toxic to cercariae. The intense activity of these substances is contrasted with the relatively harmless effect of general antiseptics such as formalin, and alkaloids such as strychine. *J. J. C. Buckley*

HALAWANI, A., LATIF, N. & TAHA, A., with the technical assistance of G. KHALAF. **On Pentabromophenol and Pentachlorophenol as Molluscacides in the Prevention of Bilharziasis.** *J. Roy. Egyptian Med. Ass.* 1951, v. 34, No. 3, 163–70.

"1. Pentabromophenol and pentachlorophenol are powerful molluscacides which are worthy of trial in the prevention of bilharziasis.

"2. They kill snails and their eggs in very high dilutions ranging from one part to five parts per million. They also interfere with the process of reproduction of the snails.

"3. They kill Bilharzia eggs, miracidia and cercariae in dilutions ranging from 5–10 parts per million.

"4. They possess no significant action on the larvae of mosquitoes. In concentrations less than 100 p.p.m., they were not lethal to the larvae of *Culex pipiens*."

Schwetz, J., with the collaboration of H. Baumann & M. Fort. Recherches sur *Schistosoma rodhaini* Brumpt 1931. (Première étude.) [**Studies on** *Schistosoma rodhaini*. **First Report.**] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, No. 4, 323–33, 7 figs. & 1 map.

Pesigan, T. P. **Analysis of 4,302 Cases of Schistosomiasis japonica.** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 203–11.

The author has already published a progress report of the work of the six field units engaged in the Schistosomiasis Research Programme of the Philippine Department of Health [this *Bulletin*, 1951, v. 48, 274]. In this, the introductory paper of a special schistosomiasis number of the journal, analyses are made of the age and sex incidence, and of the clinical grades of severity of the disease encountered in various regions of the islands. In this group 60·07 per cent. were males ; of 3,004 patients whose ages were determined 55·44 per cent. were from 11 to 20 years, and 21·68 per cent. were below 10 years old. The great majority of infections, therefore, had been contracted before the age of 20.

It was decided that a classification of the grade of severity of the disease was essential to adequate study of its many aspects. The following conventional classification was that adopted for this purpose :—

STAGE AND IMPORTANT FEATURES

" *Grade*

" A Pre-Egg Deposition Stage—(not usually seen) :—

With urticarial rashes, itchiness, localized dermatitis, cough, angioneurotic edema, fever, and other allergic manifestations. May have diarrhea.

Laboratory Aid :—Leucocytosis with marked eosinophilia—may try skin and other serological tests ; stool still negative.

" B Early Egg-Deposition with Early Hepatic Irritation :

With bloody-mucoid stools or diarrheic attacks of recent onset. Abdominal and right hypochondriac pains. Liver may be felt on deep inspiration, with slight tenderness toward the right of the epigastrium. Spleen not yet palpable. Duration of this stage—fifth week from date of exposure to one year or even earlier depending on the heaviness or severity of the infection.

Laboratory Aid :—Stool examination easily positive ; slight leucocytosis with further increased eosinophilia.

" C Late Egg-Deposition with Definite Liver Enlargement (Pre-Cirrhotic Stage) :

May have recurrence of diarrhea or dysentery-like symptoms. Abdominal and right hypochondriac pains increased. Liver enlargement marked especially below xiphoid process. Spleen only slightly enlarged. Duration of this stage—1 to 1½ years from date of exposure,

Laboratory Aid :—Stool examination—usually positive ; eosinophilia still notable, but leucocyte count may be normal or slightly higher than normal.

" D Frank Cirrhosis :

Size of liver receding but still palpable. Spleen markedly enlarged. Superficial abdominal veins visible. Ascites beginning. Emaciation is visible especially in undernourished individual. Patient may die of severe hemorrhage due to rupture of oesophageal varices. Duration of this stage—second year onwards.

LABORATORY AID :—Stool examination almost always requires concentration technics. Procto-sigmoidoscopy, rectal biopsy, or rectal crypt aspiration, skin and other serological tests often of value.

" E ADVANCED CIRRHOSIS WITH MARKED EMACIATION :

Very marked splenomegaly, liver small and contracted or non-palpable. Distinct ascites and very prominent superficial veins. Emaciation and anemia marked.

LABORATORY AID :—Usually negative on stool examination (unless with another recent exposure). May try rectal biopsy, rectal crypt aspiration, or serological and skin test. Leucopenia and moderate anemia present.

" NOTE :—Multiple exposure is the rule in endemic areas and superimposition of one grade upon another is common. Additional data that can help in making a more accurate classification should include general appearance, physical condition, and degree of anemia."

The above classification, it is stated, is based mainly " on the symptomatology, physical signs, and corresponding pathology observed during the different stages in relation to the life history of the parasite in the body of the host". Some 2,540 patients were graded according to it, and the majority were found to fall into Grade B. This was encouraging from the aspect of treatment, and further emphasizes the importance of systematic surveys in disclosing early cases while they are yet amenable to specific treatment.

Abstracts of further papers recording the activities of the research team follow below. *A. R. D. Adams*

PESIGAN, T. P., PUTONG, P. B., GARCIA, E. G. & MILLAR, C. A. **Intradermal Test for Schistosomiasis japonica (Preliminary Report).** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 212–19.

Even repeated stool examinations are often ineffective in disclosing a *Schistosoma japonicum* infection. This may be due to variability in the length of the pre-patent period, intermittency in the passage of the eggs, lightness of the infection, or a failure of eggs to escape into the bowel. In mass surveys, limitations of labour and of time permit only of the examination of very few stools from each patient, or of a couple of smears from a single stool ; the use of the sedimentation or egg-hatching techniques under such conditions is out of the question. Attention was therefore directed to a diagnostic skin test. The antigens used were aqueous extracts of adult worms or of cercariae prepared by modifications of the methods advocated by OLIVER GONZÁLES and PRATT [this *Bulletin*, 1946, v. 43, 348] for the adult worm antigen, and by ALVES and BLAIR [*ibid.*, 1947, v. 44, 826] for the cercarial antigen.

The interpretation of the test was that usually employed, measurement of the weal at 5-, 10-, 20- and 30-minute intervals after intradermal injection of the antigen, and comparison with similar measurements of a control weal. Results of tests of the two antigens are set out in a number of tables. Superficially, the cercarial antigen appeared to give a higher number of positive reactions in stool-positive patients than did the adult worm antigen ; but the figures cited, as the authors appreciated, are not strictly comparable. The adult worm antigen was very much easier to prepare in quantity, and was therefore used on the majority of the patients. Other worm infestations did not provoke false positive reactions. Some false positive reactions were obtained in schistosome-free patients, and up to 25 per cent. of false negative or only doubtfully positive reactions in cases of proven schistosomal infection. Nevertheless the authors

regard the intradermal test as " more or less specific " ; they consider it to be of great value in surveys for detecting the presence of schistosomal infection, provided that a negative skin test is not accepted at its face value in cases otherwise strongly suggestive of schistosomiasis. *A. R. D. Adams*

PESIGAN, T. P. & BELTRAN, A. M. **Studies on Liver Function Tests in Schistosomiasis japonica.** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 220–26.

Various liver function tests, including estimations of urine urobilinogen, cephalin-cholesterol flocculation, thymol turbidity, the Van den Bergh, and serum and urine bilirubin tests, were done on cases of *S. japonicum* infection of varying degrees of severity and progress. The purpose was to assess the amount of liver damage and to determine the extent of interference with the bile flow before, during, and after, fouadin treatment. The methods and results are set out in detail. The conclusion is that there was no evidence of interference with bile flow in any but three patients who were in a late stage of the disease ; no liver damage was detected during the early stages of the disease though in some advanced cases with cirrhosis there was evidence of it. Fouadin treatment did not aggravate any liver damage existing at the time it was given ; in advanced schistosomiasis with signs of liver change fouadin treatment did not rectify this. *A. R. D. Adams*

PESIGAN, T. P. & BANZON, T. C. **Hematological Studies in Schistosomiasis japonica.** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 227–33.

Studies of the blood of 95 patients suffering from parasitically proven *S. japonicum* infections revealed the following :—

" A. Before Fuadin Treatment :

" 1. Strong tendency for the production of macrocytic hypochromic type of anemia with an erythrocyte count ranging from 4·033±0·083 millions to 3·722±0·85 millions in the early stage ; and a marked decrease towards the late stages, with counts ranging from 2·656±0·465 to 3·404±0·165.

" 2. A leucocyte count from 11,038±1,995 to 15,376±891 in the early stages, with an eosinophilia ranging from 25·13 to 28·26% ; a normal lymphocyte percentage and a tendency to leucopenia towards the late stage.

" 3. There was an increased sedimentation rate, ranging from 23·66 to 47·83 mm. per hour.

" 4. Target cells were present in 68% of the cases.

" B. During Fuadin Therapy :

" 1. A tendency for the anemia in the early stages to become normocytic hypochromic in type, and the late stages to remain macrocytic. Fuadin did not cause a further decrease of the Rbc count.

" 2. A slight decrease of the leucocyte counts in the early stages, ranging from 8,738±583 to 12,018±1,408, with a further increase of eosinophilia, the values ranging from 34·24 to 35·63% in the early stages and from 25·99 to 43·2% in the later stages.

" 3. The sedimentation rate remained apparently the same as before treatment.

" 4. Target cells were present in 80% of cases.

"C. After Fuadin Treatment :

"1. Production of normocytic hypochromic anemia in almost all stages, with an almost stationary erythrocytic count in the early stage and a relative increase in the later stage.

"2. Leucocytosis was still seen in the early stages, and even in the later stage, with eosinophilia still present, ranging from 28·14 to 35·44%.

"3. There was a noticeable drop in sedimentation rate as compared with values before treatment.

"4. Lymphocytosis was seen in all cases, with 30·66 to 38·14%.

"5. Target cells were seen in 77% of cases.

"The concomitant presence of hookworm ova did not alter the macrocytic type of anemia found in schistosomiasis patients.

"Fuadin, in its therapeutic dose, did not aggravate the blood picture. On the contrary, it could be the one that might have produced improvement."

A. R. D. Adams

PESIGAN, T. P., BASACA-SEVILLA, V., PANGILINAN, M. V., SANIEL, V. F. GARCIA, E. G., BANZON, T., BELTRAN, A., PUTONG, P. B. & MILLAR, C. A. **Evaluation of Fuadin Therapy in Schistosomiasis japonica.** *J. Philippine, Med. Ass.* 1951, Apr., v. 27, No. 4, 234–41.

Not many accounts of the action of fouadin in *S. japonicum* schistosomiasis have been published. The authors have treated with it 2,407 patients in the Philippines who were suffering from parasitically proven infections with this parasite. The standard gross dosage was 40 cc. ; this was divided into 9 intramuscular injections. The first day 1·5 cc. was given ; this was increased to 3·5 cc. and then 5·0 cc. on the following two days ; thereafter 5·0 cc. was given on alternate days. Of 1,135 patients who received this standard course of treatment, 62 were still passing viable eggs at its completion. Of the 1,135 patients 1,083 were followed up subsequently [for how long is not clear] ; 847 (78·21 per cent.) of these 1,083 had ceased to pass viable ova at the time of completion of the treatment. Of the remaining 236, who still were passing viable eggs, 62 were given from two to five additional injections of fouadin, and all then ceased to pass living eggs ; so 909 (*i.e.*, 847+62) (83·91 per cent.) of the 1,083 patients given an uninterrupted course of fouadin treatment, varying from a gross 40 cc. to a gross 65 cc. of the drug ceased to pass living eggs by the end of their treatment. Of 334 of this 909 who were re-examined a month after treatment, 34 (9·28 per cent.) were found still to be voiding viable eggs. [The diagnosis and the criterion of cure rested solely on simple stool examinations.]

Though there was a fairly high incidence (63·3 per cent. of cases) of toxic manifestations as a result of the fouadin treatment these were usually mild ; in no instance had the treatment to be suspended on their account, though in some cases the interval between the injections apparently was lengthened.

The authors consider this to be numerically the most extensive observation on the treatment with fouadin of *S. japonicum* schistosomiasis so far recorded. The results obtained they consider to compare favourably with those achieved by KHALIL BEY [this *Bulletin*, 1935, v. 32, 624] with fouadin in cases of *S. haematobium* infection in Egypt.

They conclude that fouadin is fairly effective in the treatment of *S. japonicum* schistosomiasis ; at any rate it seems to stop the reproductive activity of the worms while it actually is being given. A longer-term assessment of its value is desirable, but re-infection is likely to vitiate any conclusions under the

conditions at present obtaining. [See also this *Bulletin*, 1950, v. 47, 1009, for another account of the fouadin treatment of *Schistosomiasis japonica*.]

A. R. D. Adams

Pesigan, T. P., Pangilinan, M. V., Saniel, V. F., Garcia, E. G., Banzon, T. C. & Putong, P. B. **Field Studies on the Treatment of Schistosomiasis japonica with Nilodin.** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 242–7.

A supply of enteric-coated and of plain tablets of Nilodin [miracil D hydrochloride] became available for therapeutic trial in cases of *S. japonicum* infection. This is believed to be the first occasion on which Nilodin has been used in cases of Eastern schistosomiasis. A total of 238 otherwise fit ambulant patients with parasitically proven infections, most but not all of them in an early stage, were treated orally with 60 mgm. of Nilodin per kgm. of body weight given in divided doses over 3 to 6 days. In most cases toxic reactions prevented the completion of the treatment in 3 days, and so in these it was extended over 6 days. Stool specimens were examined the day before, and a day or two after the completion of, treatment ; if the immediate post-treatment examination did not reveal eggs it was repeated within a week ; in 73 cases further stool examinations were done about a month later. Of the 238 patients who began treatment 233 completed it ; 218 (93·6 per cent.) were passing viable ova at the end of treatment, and 2 others (0·85 per cent.) found at that time to be negative later once again passed viable eggs. All of 72 patients found to be positive at the end of treatment who were re-examined a month later were found still to be passing living eggs. [There was thus no evidence of a delayed action of the drug.]

Toxic manifestations due to the drug occurred in 229 of the 238 patients ; transient abdominal pain was the most constant of these. The side-effects became apparent after the first or after the second dose of Nilodin, but seldom after the third ; in no case were they sufficiently severe to necessitate suspension of the treatment for more than one or two days. It is stated that the plain tablets caused more toxicity than did the enteric-coated tablets, owing to the more prompt absorption of the former in the upper part of the bowel.

It is concluded that Nilodin is not effective in the treatment of *S. japonicum* schistosomiasis in the dosage recommended for *S. mansoni* or for *S. haematobium* schistosomiasis.

A. R. D. Adams

J. Philippine Med. Ass. 1951, Apr., v. 27, No. 4, 249–70. [**Studies on Schistosomiasis in the Philippines. Brief Survey Reports from Medical Officers in Charge of Field Units.**] **Panguil Bay Area** (249-51, 2 maps) [Pangilinan, M. V.] ; **Leyte** (252–3, 1 map) [Basaca-Sevilla, Virginia] ; **Mindoro** (254–5, 1 map) [Saniel, V. F.] ; **Sorsogon** (256–7, 1 map) [Garcia, E. G.] ; **Samar** (258–9, 1 map) [Banzon, T. C. & Beltran, A. M.] ; **Surigao and Agusan** (259–61, 2 maps) [Millar, C. A. & Putong, P. B.] ; **Appendix A** (262–7) ; **Appendix B** (268–70).

These include a series of reports from each of the six field units on the areas of their activities. Unit No. 1 reports the incidence and distribution of cases of *S. japonicum* infection in Panguil Bay area of N.W. Mindanao, Unit No. 2 those in Leyte, Unit No. 3 Mindoro, Unit No. 4 Sorsogon, Unit No. 5 Samar, and Unit No. 6 Surigao and Agusan ; each is illustrated by a local map. [It would have been helpful to those unacquainted with the islands if there were also a general map indicating the locality of the islands and of the particular districts mentioned.]

There follow appendices recording in tables figures for the density of *Oncomelania quadrasi*, the local vector snail, and the incidence of infection in it over wide areas ; and figures showing the effect on the snails of chemical treatment of a number of streams and swamps with " Dinitro compounds ".

Finally, there is an editorial which reviews the development of the Division of Schistosomiasis of the Public Health Research Laboratories, and which emphasizes the justification for the decision for its creation [now so obviously vindicated]. *A. R. D. Adams*

PESIGAN, T. P. **An Annotated Bibliography of Available Articles on Schistosomiasis japonica based on Philippine Materials from 1906 to 1950.** *J. Philippine Med. Ass.* 1951, Apr., v. 27, No. 4, 275–327.

The object of this compilation was to bring together available articles dealing with *S. japonicum* infections, and based on Philippine materials.

It comprises 112 articles by 128 investigators. The compiler notes that only 28 of these appeared between 1906 and 1941, while of the 84 published articles included, which cover the remaining period (1945–1950), only a dozen were contributed by local investigators.

Dr. Pesigan rightly regards this as a challenge to local workers and hopes that the annotated bibliography will not only stimulate their interest, but will play its part in the campaign to eradicate schistosomiasis from the Philippines.

Each entry consists of what is, in fact, a short abstract of the paper noted : the task was obviously a formidable one and Dr. Pesigan is to be congratulated on the result of his labour which is a most valuable compendium, in chronological order, of the work done on the subject during the first half of the century.

H. J. O'D. Burke-Gaffney

PAN, C., KAUFMAN, E. H. & HUNTER, G. W. **A Technique for infecting Small Mammals with** *Schistosoma japonicum*. *J. Lab. & Clin. Med.* 1951, May, v. 37, No. 5, 817–19, 1 fig.

" A procedure for infecting small mammals, such as mice and hamsters, is described. This technique necessitates shaving the back, neck and flanks. Later the mammals are anesthetized and then immobilized over a watch glass containing infective cercariae and exposed for half an hour.

" Thirty mice were each exposed to fifty cercariae of *S. japonicum* by this technique and 857 adult parasites were recovered. The perfusion technique, originally described by Yolles and co-workers (1947) and modified by us (Pan and Hunter) for the recovery of these schistosomes, was followed. An average of 28·6 worms per mouse was recovered ; this constituted a 57·1 per cent recovery of the cercariae to which each was exposed. In addition to the mice, ten hamsters were exposed to approximately 200 cercariae each. At autopsy, it was found that these had a total of 1,935 worms or an average of 193·5 worms per animal. The findings also revealed that at least 86 per cent of these were adult worms. Since this was written, other hamsters and mice have been exposed with equally good results."

MCMULLEN, D. B. **Progress Report (1950) on a Molluscacide Screening Project.** 12 mimeographed pp. Apr. 1, 1951. Reports : Contract No. DA-49-007–MD–39/0·I. No. 143–50, 1 June, 1950, between Med. Res. & Develop. Board and Univ. Oklahoma School of Med.

A large number of chemical samples were tested against *Oncomelania nosophora*, the procedure followed being a modified plate technique. Of the 4,379

chemicals used, 40 showed activity comparable with that of three compounds known to be molluscacidal which were used as a criterion in evaluating the results. In addition, 19 dual mixtures were tested, for it had been noted that certain chemicals, especially some of the phosphates, caused great extension of the snail's body, while most of the more toxic chemicals caused the snail to retire into the shell and close the operculum. A combination of one of each of these two kinds of chemicals might therefore be very effective.

The best single chemical was 2-sec-butyl-4-, 6-dinitrophenol, with a calculated MLD 50 of 1 : 92,000. Two of the dual mixtures, made up of 2-cyclohexyl-4, 6-dinitrophenol and chemicals that caused body extension, had an MLD 50 almost double this figure. The results obtained with the active chemicals are summarized in tabular form. *J. J. C. Buckley*

HUECK, O. Fuadinwirkung bei *Opisthorchis sinensis*. [**The Action of Fouadin on** *Clonorchis sinensis*.] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 100–102.

The English summary appended to the paper is as follows :—

" Frequency, distribution and symptoms of *Opisthorchis sinensis* infestation in Kwangtung Province, China, during the last two decades are reported. Fuadin treatment gave satisfactory results, the majority of cases becoming negative in stool examinations."

SMYTH, J. D. **Egg-Shell Formation in Trematodes and Cestodes as demonstrated by the Methyl or Malachite Green Techniques.** *Nature.* 1951, Aug. 25, 322–3, 5 figs.

KENDALL, S. B. & MCCULLOUGH, F. S. **The Emergence of the Cercariae of** *Fasciola hepatica* **from the Snail** *Limnaea truncatula*. *J. Helminthology.* 1951, v. 25, Nos. 1/2, 77–92, 1 fig. [25 refs.]

" 1. Observations on *Fasciola hepatica* in *Limnaea truncatula* under laboratory conditions showed that the cercariae did not emerge at temperatures below 9°C. Above 9°C. emergence proceeded indiscriminately up to the limit of experimental observation (26°C.).

" 2. Experience showed that emergence occurred in the light or in darkness while changes in the hydrogen-ion concentration of the water containing the snails (within the range 5·5 to 8·5) had no effect on emergence. There was some evidence that an increase of carbon-dioxide in the water slowed but did not inhibit emergence but depletion of oxygen had no apparent effect.

" 3. In the laboratory, emergence could be induced by removing snails from dry habitats and immersing them in water or by removing snails from watery habitats and placing them in fresh water. We were unable to determine the exact physical or chemical factors acting as a stimulus under such conditions.

" 4. Observation suggests that the emergence of the cercariae of *F. hepatica* is largely passive and that the parasites are expelled from the body cavity of the snail as a result of unusual activity of the mantle causing increased pressure on the terminal part of the perivisceral space.

" 5. In the field temporary flooding of the habitat of the snail leads to circumstances favourable both for the emergence of cercariae and for their encystment under conditions likely to favour transmission to the definitive host."

FAIN, A. Notes écologiques et parasitologiques sur *Lymnaea* (*Galba*) *truncatula* Müller au Congo Belge. [**Ecological and Parasitological Notes on** *L. truncatula* **in the Belgian Congo.**] *Ann. Soc. Belge de Méd. Trop.* 1951, Apr. 30, v. 31, No. 2, 149–52.

The occurrence of *Lymnaea truncatula* is recorded for the first time in the Belgian Congo, where it was found commonly in small rivers near Blukwa at an altitude of 1,850 to 1,900 metres, in habitats characterized by damp mud trampled by oxen and having little or no shade and poor vegetation. The snails were infected with xiphidiocercous cercariae and amphistome cercariae thought to be those of *Cotylophoron cotylophorum*, which is common in the bovine animals of that region. No cercariae of *Fasciola hepatica* or *F. gigantica* were found and it appears that, as in other parts of Africa, *L. truncatula* is not a vector of *F. gigantica* in the Belgian Congo, where the latter is common and takes the place of *F. hepatica*. However, the author records as a preliminary note, that the vector of *F. gigantica* in the Belgian Congo is *Lymnaea natalensis undussumae*. *J. J. C. Buckley*

VARTIAINEN, O. **The Anthelmintic Effects of Thymol and p-Cymene. A Pharmacological and Clinical Study, with special Consideration of the Fish Tapeworm Disease.** *Ann. Med. Intern. Fenniae.* Helsinki. 1950, v. 39, Suppl. 9, 87 pp., 10 figs. [85 refs.]

In Finland, infection with the fish tapeworm (*Diphyllobothrium latum*) is very common ; it is estimated by various reliable investigators to occur in 14 to 25 per cent. of the whole population. The infection is acquired by eating raw or inadequately salted fish ; in the affected populations this is a deeply ingrained practice which, in view of the usual mildness of the symptoms, it is impossible to change. Hitherto most of the attention of investigators has been given to the more serious complications of this infection, especially the anaemia, and little to the treatment of the infection.

Extract of male fern is the accepted treatment for this infection and from 100,000 to 150,000 treatments are given annually. This drug is available without prescription. However, a number of fatal poisonings have been reported recently ; in these cases the dosage was often not more than 3 or 4 gm. which, though an effective dose in fish tapeworm infection, is lower than that usually given in beef tapeworm infections. There is thus a place for a safer anthelmintic for the fish tapeworm infections.

The present series of investigations were undertaken to test the efficacy of thymol and the chemically related drug *p*-cymene. As well as a clinical trial, pharmacological experiments were carried out in animals to test the anthelmintic properties, mode of action, and toxicity, of these drugs.

Experiments with earthworms show that the irritating properties become apparent at dilutions of 1 in 400,000 to 45,000 of thymol and about double this strength of *p*-cymene, and paralysis of muscle preparation occurred at 1 in 50,000 to 1 in 60,000 of thymol and four times this strength of *p*-cymene ; both properties are essential for a successful anthelmintic. Fish (*Carassius auratus*) were killed by dilutions of 1 in 10,000 and 1 in 5,000 of these drugs, respectively. The minimal lethal dose (DL50) for rabbits was 2 to 4 gm. of thymol per kgm. but the DL50 dose for the mouse was 3 to 7 times smaller, and of *p*-cymene it was 2 to 4 gm. per kgm. for each animal. The comparable DL50 dose for a man of 60 kgm. would be 120 gm. to 240 gm.

Thymol was given in sugar-coated pills in doses from 1 to 6 gm. in 178 cases of fish tapeworm infection. These amounts were given both as single doses and in other cases divided into 3 or 4 doses at half-hour intervals. In 156 cases

worms were discharged. The results with the different doses varied very little ; of the total number treated 168 were followed up by one or more stool examinations up to 8 weeks, and 83 cases were classified as successful and 85 as failures. Among those receiving 1 to 2 gm. there were 20 successes and 27 failures, whereas with the larger doses the successes usually exceeded the failures. With male fern an 80 to 90 per cent. success may be expected.

The unfavourable reactions were few, but with the larger doses the majority of patients complained of epigastric pain and nausea of a few hours' duration.

The drug did not have any effect on *Taenia saginata* or *Ascaris lumbricoides*.

" In view of the fact that thymol seldom gives rise to untoward symptoms the writer considers it the drug of choice against *Diphyllobothrium latum* whenever the use of male fern extract is contraindicated on account of the patient's poor general condition. He recommends a dose of two to four grammes divided into portions of one gramme, administered at half-hour intervals. In order to avoid any toxic symptoms care must be taken that the patient is not weakened by fasting and that the cathartic is sufficient and is given in time. Twenty to thirty grammes of magnesium sulphate in water is recommended as a cathartic ; this should be administered two hours after the intake of the last portion of the anthelmintic dose at the latest. An enema is given two hours after the administration of the cathartic. Since any untoward symptom caused by thymol passes off rapidly, the anthelmintic treatment can be repeated immediately in case of failure."

One hundred cases were treated with *p*-cymene in doses from 1 to 10 gm. (one case only). Worms were discharged in 70 per cent. and of the 92 cases followed up only 26 were classed as successful. The percentage of failures was actually higher in those receiving the larger doses.

Untoward results were less frequent with *p*-cymene than they were with thymol, but the low percentage of successes rules out this drug as a practical anthelmintic. *L. E. Napier*

GAUGUSCH, Z. **Contribution to Studies of the Resistance of** *Cysticercus cellulosae*. *Bull. State Inst. Marine & Trop. Med., Gdańsk, Poland.* 1950, v. 3, Nos. 1/2, 85–7.

Viability tests were carried out on *Cysticercus cellulosae* after pieces of infected pork had been exposed for varying periods to the action of low temperatures, brine solution and putrefaction. A modified version of Müller's viability test was used, consisting of the addition of 5 cc. of filtered pig's gastric juice to 20 cc. of the 50 per cent. solution of pig bile in physiological salt solution, which was found to accelerate the eversion of the scolex in living cysticerci.

A meat sample (1 kgm.) was kept at 0° to 2°C., and 5 to 10 cysticerci were removed daily for viability tests. The cysts were resistant to this treatment for 53 days. On the 53rd day 3 out of 10 cysts removed were alive. No living cysts were found on the 54th, 55th and 56th days. Another meat sample was kept at a constant temperature of −5°C. and the same procedure was followed. After 6 days, of 10 cysts removed and examined, 2 were alive. After 7 and 8 days, none was alive.

Two meat samples (1 kgm.) were treated with salt solution by the " tank-brine " and " injection-brine " process used in the bacon industry, and kept at +4°C. and cysts were removed daily and examined as above. Viable cysts were found up to 3 days later ; on the fourth day the cysticerci examined were dead.

Untreated samples of infected ham were kept at a temperature of 18° to 20°C. Cysts were removed and examined daily after the third day when visible putrefaction of the meat had begun. Viable cysts were recovered from the meat up to 26 days later. Only dead cysts were removed on the 27th and 28th days. *J. J. C. Buckley*

MAGATH, T. B. **The Present Status of Hydatid (Echinococcus) Disease in North America.** *Archivos Internac. de la Hidatidosis.* Montevideo. 1950, Oct., v. 11, Nos. 1/2, 193–210, 3 figs. [36 refs.]

The incidence of human hydatid in North America, exclusive of Mexico, is low. Since 1808, when the first case was seen, there have been reports of 596 cases, of which it is estimated that about 95 per cent. have been immigrants from countries where echinococcosis is prevalent in man and domestic animals, and since male immigration has far exceeded that of females, the infection is predominantly one of males (64 per cent. as against 36 per cent.).

Only 35 persons are reported to have acquired the infection in North America since 1808, this very low figure corresponding with the lack of evidence that dogs are infected. Small foci of infection exist however in the Louisiana-Arkansas area, in California, Ontario and Utah and possibly elsewhere. The yearly incidence of autochthonous cases has not changed in the past 50 years and averages about one for every two years. Definite information as to the incidence of hydatid disease in domestic animals is lacking, but there is evidence that it is rare, that no increase has occurred in sheep but that the incidence in hogs has increased ten times during 1899–1924. The possibility that wild animals may be acting as a reservoir of the infection is suggested by the occurrence of hydatid cysts in moose in northern Minnesota and of adult worms in timber wolves in the same region. *J. J. C. Buckley*

BOCCHETTI, G. La diagnosi biologica dell'echinococcosi. [**The Biological Diagnosis of Echinococcosis.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Mar., v. 32, No. 3, 165–76. [42 refs.] English summary.

In the Surgical Teaching Hospital of Rome, over 350 patients have been operated on for echinococcus cyst of the lungs, liver, kidneys, brain, spleen and other parts of the body, during the last 10 years. In the study of laboratory specimens from these cases the results of the eosinophile count, the Casoni reaction and the Ghedini-Weinberg test have been compared. The eosinophile count was over 20 in 2·5 per cent. of the cases ; 10–20 in 15·1 per cent. ; 5–10 in 30·2 per cent. ; and less than 4 [it is not clear if there ever was a count of 4] in 44·2 per cent. The Ghedini-Weinberg test proved positive in 2·83 per cent., and the Casoni reaction was positive in 71·1 per cent. of the cases. The Ghedini-Weinberg test is, therefore, the least sensitive of the three.

It is suggested that " dissociated " reactions are due to the prevalence of one or other active principle, probably amino-acids, in the hydatid fluid from the particular cyst. *J. Cauchi*

SOHIER, H., PARIS, P. & CAMAIN, R. Appendicite et kyste hydatique de l'épiploon. [**Appendicitis and Hydatid Cyst of the Omentum.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1951, v. 8, No. 1, 49–52.

EICHBAUM, F. W., KOCH-WESER, D. & LEAO, A. T. **Activity of Cashew (Anacardium Occidentale) Nutshell Oil in Human Ancylostomiasis.** *Amer. J. Digestive Dis.* 1950, Nov., v. 17, No. 11, 370–71, 1 graph.

In a previous communication two of the authors have reported on the vermicidal effect of cashew (*Anacardium occidentale*) nutshell oil (CNO) in dogs ;

a single dose of 0·5 to 1·0 gm. removed 90 to 100 per cent. of *Ancylostoma* and *Toxocara* without toxic effects. They now report the effect in human cases of ankylostomiasis.

Cashew nutshell oil was given in gelatin capsules (1·0 gm. per capsule) in doses of 3 to 4 capsules for children and 4 to 6 for adults, in the morning on an empty stomach, and food was withheld until noon. If necessary this dose was repeated up to four times at intervals of two weeks : the average total dose given was 13 grammes. Egg counts were made before and at intervals after treatment.

The infection was cured in 14 of the 22 patients treated. Five of the refractory cases came from a very heavily infected family, 13,600 to 45,000 eggs per gramme of faeces. In those in which the drug failed to clear the infection the egg counts were reduced by 78 to 99 per cent. There were no toxic effects ; the drug, however, had a mild purgative action.

As the relative dose was well below the dose tolerated by dogs, it is considered that a higher dosage might be tolerated by man.

[The results of treatment with this drug in the dosage given are not as good as one expects to obtain with either hexylresorcinol or tetrachlorethylene in safe dosages.] *L. E. Napier*

Biocca, E. **On *Ancylostoma braziliense* (de Faria, 1910) and its Morphological Differentiation from *A. ceylanicum* (Looss, 1911).** *J. Helminthology.* 1951, v. 25, Nos. 1/2, 1–10, 4 figs. [18 refs.]

Considerable confusion has existed in the literature as to the separate identity of *A. braziliense* and *A. ceylanicum*, of which the former has been recorded as an occasional intestinal parasite of man and whose infective larvae have been blamed for the condition in human skin called " creeping eruption ". There has been a tendency to regard *A. ceylanicum* as a synonym of *A. braziliense*, but this is strongly disputed by the author, who claims that the incomplete descriptions of *A. braziliense* make this conclusion invalid. In a careful and thorough research into the literature and by examination of a large body of representative material, he comes to the conclusion, which on its merits must be accepted, that *A. braziliense* and *A. ceylanicum* are separate species.

" The demonstration of the validity of the species *A. braziliense* and *A. ceylanicum* creates new epidemiological problems. In fact, there is now no proof that man is a host of the adult of *A. braziliense*, while *A. ceylanicum* is, in some parts of the world, a relatively frequent parasite of man. Similarly, there is considerable doubt as to whether ' creeping eruption ' in man has ever been produced by the larvae of *A. braziliense*." *J. J. C. Buckley*

Galliard, H. Recherches sur l'infestation expérimentale à *Strongyloides stercoralis* au Tonkin. (1re note.) [**Experimental Infection with *S. stercoralis* in Tonking.**] *Ann. Parasit. Humaine et Comparée.* 1950, v. 25, Nos. 5/6, 441–73, 4 figs. (2e note.) *Ibid.* 1951, v. 26, Nos. 1/2, 67–84, 1 fig. (3e note.) *Ibid.* No. 3, 201–27. [Numerous refs.]

The following is a free translation of the final part of the author's summary in French :—

(*a*) The exogenous development is clearly influenced by temperature. Infective larvae live longer in carbon faecal culture at 8°C. and 15°C. in Tyrode's solution or Ringer's solution.

(*b*) A fundamental change in the type of the exogenous development takes place when the larvae, between each passage in dogs, are kept at 8°C. for 10 days and then at a normal temperature for 6 hours before inoculation. At the ninth passage the type of development is entirely direct, the sexual cycle being suppressed. Reversion to the normal type occurs when exposure to cold is discontinued. The infectivity of larvae refrigerated this way is considerably reduced and this reduction continues after a certain number of passages.

(*c*) Exposure of the duodenal region to X-rays partly reduces parasitism. Their action results also in a change in the exogenous cycle (a very marked tendency to the direct type) and a significant lowering of infectivity.

(*d*) The effect of therapeutic agents of any kind (saline purges, chenopodium, sulphonamide, antimony compounds) given orally or subcutaneously, is to reduce more or less, but never completely, the number of parasitic females. Prophylactic treatment during the migratory phase of the larvae is ineffective. Anthiomaline reduces the type of the exogenous development in a direct way. Anthiomaline and soluseptasine reduce infectivity. All these modifications are reversible.

The action of different physical and chemical factors demonstrates an extraordinary susceptibility to external influences in the biology of *Strongyloides stercoralis* both in the parasitic and free-living generation, which explains the existence of so many biological races, not only geographical but also local, and the sporadic occurrence of fatal hypervirulent strongyloidosis. It is also certain, judging from the divergent experimental results obtained by different authors and by the writer, that the same factors can produce completely opposite effects in different parts of the world. And since no human experiments have been carried out, it is impossible to give a complete and valid explanation of what determines the type of the free-living generation. *J. J. C. Buckley*

ALTOUNYAN, E. H. R. **Ascaris impacted in Common Bile Duct.** [Memoranda.] *Brit. Med. J.* 1951, Aug. 11, 338–9.

Routine stool examinations extending over a period of 30 years in a hospital in Aleppo have shown that *Ascaris* infection among Syrians is almost universal. The worms have also been found in a liver abscess, in the appendix and as the primary cause of intestinal obstruction. They have also been suspected of causing cholecystitis. Here recorded is the first proved case in Aleppo of ascarides causing obstruction of the common bile duct.

A woman of 45 years of age was admitted for severe epigastric pain and persistent nausea, with a history of similar but less severe attacks during the last 30 years. On examination she was found to have acute tenderness over the gall-bladder, no jaundice, a temperature of 101·3°F., a leucocyte count of 17,500 and cholecystographic evidence of a non-functioning gall-bladder.

At operation the common bile duct presented as a thick white cord of the calibre of small intestine. The duct was opened and the lumen was found to be entirely filled by a " firm, white, twisted, cable-like mass consisting of 21 large ascarides ". Both hepatic ducts were grossly dilated and one or two worms were removed from the right duct.

The liver had many scars and one fibrous nodule on its surface. Biopsy of the liver showed considerable periportal fibrosis with bile-duct hyperplasia and round-cell infiltration.

The patient made a smooth recovery. *M. E. Delafield*

JELLIFFE, D. B. **Oil of Chenopodium in the Treatment of Ascariasis. (Report of Three Cases of Fatal Liver Damage in African Patients.)** *J. Trop. Med. & Hyg.* 1951, July, v. 54, No. 7, 143–6, 4 figs.

Ascariasis is common in most parts of the tropics and in many places it is almost universal. The author found that, in Ibadan, Nigeria, 80 per cent. of house servants were infected. He briefly describes the variety of symptoms ascribed to *Ascaris* and states that in Ibadan, as elsewhere, vague ill-health is often attributed to it and that treatment with proprietary remedies is carried out at home. An example of the crude advertisements of these remedies is reproduced. Indiscriminate use of toxic anthelmintics, more especially of oil of chenopodium, is not without risk and the author reports on 3 cases which illustrate this risk. All were treated with proprietary remedies containing oil of chenopodium and castor oil.

The first patient was an Ibo boy aged about 12 who had been treated for vague lower abdominal pain with the proprietary remedy. Two days before admission he had vomited several times ; the day before admission he became drowsy, developed jaundice and was stuporose on admission. Respiration was slow and stertorous, the spleen was palpable two finger-breadths below the costal margin and the urine had a trace of bile pigment. Acute yellow atrophy was diagnosed, but treatment failed and the boy died on the second day after admission. At autopsy the liver was yellow and fatty and showed extensive areas of necrosis, surviving liver cells being granular and moderately fatty.

The second patient was a young Ibo male admitted in a stuporose state with a history of generalized abdominal pain ten days earlier, which was treated with a similar proprietary remedy. There was moderate icterus. The irregular firm margin of the liver extended one finger-breadth below the costal margin and there was a minimal amount of fluid in the abdominal cavity. The patient died on the day of admission and autopsy showed hypertrophic cirrhosis.

The third was a middle-aged Yoruba male brought to hospital unconscious with a history of treatment ten days earlier with a similar proprietary remedy. Two days before admission he had become stuporose. He was moderately jaundiced and dehydrated with slow, stertorous respiration. He died two days after admission and autopsy was not allowed.

Discussing these cases the author observes that it seems certain that, in many parts of the tropics, relatively toxic anthelmintics will have to be sold over the counter in commercial dispensaries for many years to come and that the slight risk entailed is justified, provided that precautions are taken. The ideal cheap, non-toxic anthelmintic, effective especially against both *Ascaris* and hookworms, is not yet available. Hexylresorcinol, which has been recommended, is too expensive, and tetrachlorethylene, which is cheap and non-toxic, is effective against hookworm, but not against *Ascaris*. The author visited ten dispensaries in Ibadan and found that all were selling mixtures containing oil of chenopodium and castor oil, with instructions on the bottles in English only. The doses recommended were safe and adequate, but the risk is that the instructions will not be followed and the bottles contain several times the required dose. Also most authorities agree that oil of chenopodium should not be given at the same time as castor oil, because the latter increases the absorption of the former. In view of the liver disease, very frequently unsuspected, that may be present in the poorer African, it is surprising that more instances of liver damage due to oil of chenopodium are not reported. This drug was probably responsible for the three deaths from liver failure reported by the author. To reduce the risks the author suggests the sale of packs of different sizes for the different age-groups, each containing a single dose of oil of chenopodium in capsules, with magnesium sulphate as a

purgative, instructions for use of the drugs being printed in the local languages as well as in English. *G. Lapage*

East Africa High Commission. **Filariasis Research Unit. Departmental Annual Report No. 2, 1950** [Laurie, W., Director]. 61 pp., 3 figs. [49 refs.] Nairobi.

This annual report contains general discussions of many aspects of filariasis ; only the actual observations of the Unit can be abstracted here. Investigations have been made on skin tests by the intradermal injection of filarial antigen from various sources ; but the results on a small number of patients were less satisfactory than those recorded by previous workers. Microfilaria counts were made on about 20 patients, duplicate counts (each for 60 cmm.) being made on both finger blood and vein blood. In some cases marked variations were found between the first and the second specimens taken from the finger or vein (one count might be twice the other) while the counts from the finger were sometimes 15 times as great as those from the vein.

Microfilarial surveys have been made of various places near Lake Victoria, and taking adult persons only, the following rates were found for *W. bancrofti* (B) and *D. perstans* (P) :—

Biharamulo 0·3 per cent. B, 9 per cent. P ; Bukoba 1 per cent. B, 12 per cent. P ; Geita 12 per cent. B, 2 per cent. P ; Kahama 10 per cent. B, 1 per cent. P ; Kwimba 22 per cent. B, 2 per cent. P ; Musoma 16 per cent. B ; Mwanza 13 per cent. B, 2 per cent. P ; Ukara 26 per cent. B ; Kyela (on Lake Nyasa) 37 per cent. B.

On the whole the frequency of elephantiasis in a district bears a rough relationship to the number of people carrying microfilariae and to the intensity of their infections.

A very interesting account is given by Dr. M. H. Trant of a survey carried out round Kyela at the northern end of Lake Nyasa. The country there is flat with a heavy rainfall and thick vegetation. Food is plentiful but so are mosquitoes. Some 33 per cent. of the people showed microfilariae and about 1 per cent. suffered from elephantiasis.

Various observations have been made on the treatment of filariasis by hetrazan, including some measurements of the blood concentration. When doses of 12 mgm. hetrazan citrate per kgm. were given every 12 hours to 34 patients, the level of hetrazan base in the blood was about 3 μgm. per cc. [not mgm. as shown on fig. A of report]. The excretion in the urine occurred at the rate of 15 mgm. base per hour, the total output in the urine being about a third of the amount ingested. [This being the case, it is difficult to understand the statement that " the *greater part* of the drug taken is excreted rapidly by the kidneys ".] In non-filarial subjects, given toxic doses of hetrazan, the earliest toxic effects were anorexia, nausea, drowsiness, headache, and vomiting. In filarial subjects other workers have reported severe allergic reactions following hetrazan, but these have not been seen at Mwanza. Out of many hundreds of patients treated, only 3 showed such symptoms, *viz.*, 3 schoolboys who each developed epididymo-funiculitis a few days after finishing a two-day course of treatment. To avoid any irritant effect on the stomach due to the excipients present in tablets, the drug is now given as the powdered citrate which is soluble and pleasant to take. The dosage now preferred is 12 mgm. per kgm. (of citrate) morning and evening for 3 days. Mention is made of nine moderately heavily infected patients who had been given a single dose of 20 mgm. per kgm. body weight ; in 8 of these the microfilariae were still absent from the blood two years later, so presumably the adult worms had been killed or sterilized.

Summary of relationship between total dose retained of hetrazan citrate and the Mf. *counts six months after treatment (single-day courses only)*

Total dose retained mgms./kg.	No. of cases	Total No. of Mf. 60 mm.		Reduction per cent.	Cases negative for microfilariae after 6 months	
		Before treatment	Six months after treatment		No.	Per cent.
Less than 50	78	18,664	1,485	92	11	14
50–75 ...	32	5,348	128	97·5	10	30
76–100 ...	18	4,039	153	96·3	4	25
100–125 ...	2	250	8	97	1	50

Summary of relationship between pre-treatment and post-treatment Mf. *count in 145 African patients suffering from bancroftial filariasis*

Pre-treatment Mf. levels (per 60 mm. blood)	No. of cases	Cases negative for microfilariae six months after treatment	
		No.	Per cent.
1–25	10	9	90
26–50	23	11	48
51–100	24	7	29
101–200	31	8	26
201–300	21	4	19
Over 300	36	2	5

Apparently the patients with greater numbers of microfilariae are more difficult to sterilize than those with smaller numbers. It is considered that the maximum dose should not be less than 70 mgm. per kgm., *e.g.*, 12 mgm. per kgm. every twelve hours for 3 days. This costs almost ten shillings per individual, which is a serious obstacle to widespread use.

Ten patients with elephantiasis of the legs were treated and observed for a long time. In 2 there was a slight insignificant decrease of the limb measurements ; in 3 others the limb became softer although no smaller ; in 5 the condition was unchanged.

Eighty patients infected with *Dipetalonema perstans* have been treated with hetrazan to a total of 70 mgm. per kgm. during 5 days ; there was no effect on the number of microfilariae in the blood.

Ten patients with bancroftian filariasis were treated with N-methyl glucamine antimoniate (Protostib), the total dose being 0·4 to 1 gm. per kgm. body weight during 5 to 10 days. In 9 patients there were no significant toxic effects ; in the tenth patient, who was also receiving sulphathiazole, acute haemolytic anaemia occurred 6 days after the last dose of protostib. This may have been due to the sulphathiazole. In 8 of the patients there was no significant change in the microfilariae count within 8 weeks, but in one patient the count fell from 300 per 60 cmm. to 3 in 16 weeks.

In appendices to the report a list is given of 14 wild animals which have been found to harbour microfilariae ; and preliminary notes are given about some of the mosquitoes which may be concerned in transmitting filariasis.

F. Hawking

POLUNIN, I. **Observations on the Distribution of Filariasis in the Interior of the Malay Peninsula.** *Med. J. Malaya.* 1951, June, v. 5, No. 4, 320–27, 3 maps.

The author refers to the findings of POYNTON & HODGKIN on endemic filariasis in Malaya [this *Bulletin*, 1939, v. 36, 149]. He has himself studied the incidence in some inland areas and recorded his findings in detail in 3 maps and a table : these should be consulted for the details ; but it is evident from them that the distribution is extended far beyond the foci previously described.

The previous movements of those suffering from elephantiasis were checked and in 9 of 10 groups, microfilariae were found in the blood of neighbouring persons : they were also found in people in two areas said to be free from elephantiasis.

Details are given of findings in undeveloped areas of Perak, Pahang and Selangor among Aborigines or Malays or both. These extend the previous findings reported from jungle swamp along the lower reaches of larger rivers and coastal rice field areas. Indeed, evidence of endemic filariasis was found in most of the inland areas studied, sometimes to the extent of a 50 per cent. parasite rate.

An interesting feature was the finding of elephantiasis and microfilariae in some Aborigines who lived at an altitude of 1,250 to 2,800 feet, indicating that the disease penetrates into mountain areas.

Although the full geographical distribution of the disease has not yet been defined, it is evidently greater than has hitherto been described.

H. J. O'D. Burke-Gaffney

FAIN, A. Étude morphologique des formes parentales de *Wuchereria bancrofti* Cobbold 1877 récoltées au Congo Belge. [**Morphological Study of Parental Forms of *W. bancrofti* from the Belgian Congo.**] *Ann. Parasit. Humaine et Comparée.* 1951, v. 26, No. 3, 228–44, 5 figs. [20 refs.]

The material studied consisted of 9 adult female and 10 adult male *W. bancrofti* which were recovered from 3 male Africans of Kwango, Belgian Congo. Particulars of these patients and the parasites are as follows :—

1. Aged about 50 years. A thick blood drop contained 142 microfilariae. There was a hydrocele on right side, and bilateral inguinal adenolymphocele. Five female and three male worms were surgically removed from fibrous tissue in the hypertrophied left glandular mass.

2. Aged about 50 years. Numerous microfilariae were found in peripheral blood. There was a large unilateral hydrocele and elephantiasis of both feet. Three male worms were removed by operation from the middle of the mass of the seminal tubules of one enlarged testicle.

3. A very old man. A thick blood smear showed 130 microfilariae. He had a voluminous double hydrocele and some elephantiasis of the scrotum. Four female worms and four males were surgically removed from the vicinity of one of the testes, which was much enlarged. Three of the males were moving freely in the mass of the seminal tubules.

This collection of adult *W. bancrofti* appears to dispose of the old idea that female worms are always more numerous than males. The present evidence suggests that this so-called relative scarcity of males is due to the fact that they are merely more difficult to find, not only on account of their smaller size, but because they frequent healthy as well as diseased tissue where they are less likely to be sought and less easy to find.

Previous descriptions of *W. bancrofti* have been of worms of non-African origin, and it is remarked that there is considerable divergence in descriptions by different authors. The present contribution to the subject is therefore of value as it deals for the first time with African specimens and represents an earnest effort to produce a complete and accurate account of their morphology and to amplify where possible the present knowledge of the species. In describing the material the author makes frequent references to corresponding measures and descriptions of other authors and the measurements are conveniently set down in tabular form. Points of interest noted in the African specimens are the rather smaller length of the females (71–82 mm.), and the longer male tail (140–180 μ) than that in other descriptions. The spicules are also slightly longer. Considerable attention is given to the description of the male tail and accessory genitalia which are of such importance in taxonomy and of which previous accounts have been somewhat conflicting.

The work is well illustrated and contains the first published picture of the ventral view of the male tail, which clearly shows the distribution and arrangement of the much-discussed caudal papillae. *J. J. C. Buckley*

HUARD, P. & TRAN ANH. L'intradermo-réaction chez les filariens de Hanoi. [**The Filaria Intradermal Reaction in Cases of Filariasis in Hanoi.**] *L'Extrême-Orient Méd.* Hanoi. 1950, June–Dec., v. 3, No. 4, 203–12. [18 refs.]

According to STEFANOPOULO a positive filaria intradermal test is characterized by sharp widespread erythematous and clearly marked reaction, with infiltration of the skin.

This intradermal reaction was tested in the Yersin Hospital in Hanoi with two different antigens from *Dirofilaria immitis*, one prepared by the Institut Pasteur in Paris, the other by the National Institute of Health, Washington. [It is not clear how many subjects were tested with each antigen.]

In the first instance the Paris antigen was used, in a dilution of 1 : 500 ; the American antigen was diluted 1 : 8,000. As controls normal saline or human serum, or dog protein (for the American preparation), were employed. The authors consider that, at least, one control is necessary to avoid false positive reactions. The intradermal test with 0·1 cc. was applied to all those presenting the clinical symptoms of filariasis, whether microfilariae were demonstrated in the blood or not. The French preparation evokes a slower reaction, but the effects last longer than with the American antigen.

In 23 cases of haematochyluria, 20 gave strong positive reactions, 2 doubtful and 1 negative. In 13 of the 20, microfilariae were demonstrated at various times. In 15 patients with hydrocele there were 10 positive reactions, 1 doubtful and 4 negative, and in 8 microfilariae were present.

In one case of lymph scrotum the reaction was positive. Of three cases of elephantiasis without microfilariae the results were negative in two, doubtful in one. The authors suggest even that lack of reaction in this condition renders its true aetiology doubtful. Still more difficult to explain was a subject with chyluria excreting numerous microfilariae in the urine, but in whom the intradermal reaction remained consistently negative ; the authors attribute this to the debilitated condition of the subject.

The authors conclude that this test can be relied upon in 60 to 80 per cent. of cases ; furthermore that, owing to its simplicity it can be used to make a filarial survey in an endemic area, as it can be done rapidly and simply. They think that, whenever possible, the intradermal test should be backed up by the complement-fixation test. *P. Manson-Bahr*

PAEZ, H. Étude d'un cas d'hématochylurie due à *Wuchereria bancrofti*. Traitement par le 1-diéthyl-carbamyl-4 méthyl pipérazine (Hetrazan). [**A Case of Haematochyluria due to *W. bancrofti*. Treatment by Hetrazan.**] *Ann. Parasit. Humaine et Comparée*. 1951, v. 26, No. 4, 346–60, 5 figs.

A description is given of a case of chyluria in Costa Rica occurring in a Negro youth aged 17 years. The chyluria had begun one month previously. At 10 p.m. the blood contained about 286–580 microfilariae (*W. bancrofti*) per 20 cmm. ; periodicity was well marked. The opacity of the urine was measured in units, one unit being the quantity of chyle per cc. which produced an opacity equal to 100 of the Kingsbury Clark scale. The maximum opacity occurred at night and was equal to about 29 units. The microfilariae in the urine were measured as the number found in 0·2 cc. of deposit obtained by centrifuging 10 cc. of urine. [This introduces an error, since an increase in the deposit would diminish the apparent number of microfilariae.] There was no direct relationship between the degree of chyluria, the number of microfilariae or the haematuria. All three tended to be more marked at night than at mid-day. [This is remarkable, since chyluria is usually most intense after meals ; no records are given of the patient's eating habits.] Hetrazan at the rate of 1 mgm. per kgm. [apparently reckoned as the citrate salt] was given thrice daily for 7 days (Sept. 27–Oct. 3). Within two days the microfilariae of the blood at 10 p.m. fell to about 5–16 per 20 cmm. There was a moderate diminution of the chyluria but the haematuria was intensified, so that the urine was salmon-coloured and contained clots. Consequently treatment was stopped on the 7th day, when 1 gm. had been given. The microfilariae in the urine had continued at a high level (20–50) for 4 days and then abruptly diminished to about 3. After treatment was stopped, the haematuria and chyluria gradually diminished till Oct. 14, and then they rose again. The microfilariae of the urine tended to rise a little towards the end of this period, while those of the blood remained constant at about 20–40 per 20 cmm.

The second course of treatment consisted of 150 mgm. per day for 12 days to October 30, total 1·75 gm. After the second day of this the microfilariae disappeared from the blood except for occasional one or two specimens which were seen at intervals till the end of observation on November 30, 1949. [This suggests that there was some place in the body, in which microfilariae were not killed by hetrazan and from which microfilariae continuously escaped into the blood.] The chyluria persisted at a moderate level but the microfilariae in the urine were reduced to very small numbers after October 21. Haematuria improved at about the same date. The patient was kept under close observation for 30 days. The microfilariae of the blood continued to be very few or to be absent. By November 22 the urine was completely normal.

[In this case the disappearance of the microfilariae from the blood (although rather slow) was certainly due to hetrazan, and so probably was their disappearance from the urine. The cessation of chyluria and haematuria might be due to non-specific causes, *e.g.*, rest in bed.] *F. Hawking*

HUGHES, M. H. & SARKIES, J. W. R. **The Length of Exposure to Infestation and the Danger of Contracting Onchocerciasis.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 73–7.

This investigation was carried out on the lower reaches of the River Volta in the southern Gold Coast Colony, where an important hydro-electric scheme is projected and where onchocerciasis has already been reported as endemic (*Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, Oct., v. 45, 243.) The purpose of the

enquiry was to assess the risks to imported workers in such an area, by determining the period of exposure necessary for the appearance of microfilariae of *O. volvulus* in the skin and eyes. Labourers (270) employed on the lower Volta River and schoolchildren (224) from two villages were examined for the presence of microfilariae in the skin and eyes ; eye lesions, nodules and visual acuity were also observed.

The results, which are clearly set out in tabular form, show that in both groups the incidence of microfilariae in the skin gradually increased with length of exposure but that the incidence in children was less at all ages than in labourers. Among the labourers the incidence with microfilariae in the eyes increased from 4 per cent. for up to 2 years' exposure to 30 per cent. for 10 years' exposure or over. Microfilariae were not seen in the eyes of any children exposed for less than 10 years, but one child in the 3–6-year age-group showed eye lesions and microfilariae in the skin. The summarized results of all the examinations are as follows : Labourers : 76 per cent. with microfilariae in the skin ; 22 per cent. with microfilariae in the eyes ; 16 per cent. with eye lesions. Children : 37 per cent., 10 per cent. and 16 per cent. respectively. The commonest ocular lesions were scanty interstitial nummular opacities of the cornea, but it was remarked that frequently, 81 cases in all, eye lesions were absent from eyes that were swarming with microfilariae.

The authors' conclusions from the survey are that a long period of exposure is necessary before serious manifestations of the disease appear, but most adults show microfilariae in the skin after 5 years' exposure and 30 per cent. in the eyes after 10 years. Although workers in endemic regions comparable to the lower Volta run a risk of incurring onchocerciasis, Europeans much less so than Africans, the important point is made that detection of the infection and consequent medical supervision is possible long before irreversible damage is done to the eyes. *J. J. C. Buckley*

See also p. 1043, SARKIES, **Ophthalmoscopic Detection of Microfilaria of *Onchocerca volvulus*.**

ONABAMIRO, S. D. **The Transmission of *Dracunculus medinensis* by *Thermocyclops nigerianus*, as observed in a Village in South-West Nigeria.** *Ann. Trop. Med. & Parasit.* 1951, May, v. 45, No. 1, 1–10, 3 figs. on pl.

A technique was devised for measuring the density of *Cyclops* in their natural habitats, with a view to estimating the risk of incurring infection with guinea-worm by villagers using different sources of water at different times of the year in the village of Iwoye. The percentage of infected *Cyclops* was also calculated and the villagers were examined at different seasons for the presence of guinea-worm infection.

At the height of the dry season (April, 1950) 83 per cent. of the villagers (about 900) showed evidence of active infections. Worm counts in 62 of these showed 27 with a single worm, 18 with two worms, 10 with three worms, 5 with four worms and 2 with five worms. The usual site of the infection was on the lower parts of the legs, especially the ankles and toes, but the scrotum, chin, arms and fingers were also occasionally infected. Water samples were examined during this month and were taken from different parts and at different depths of a pond which was in frequent use. The sampling revealed that four species of cyclops were present, *Microcyclops linjanticus*, *Tropocyclops confinis*, *Platycyclops phaleratus* and *Thermocyclops nigerianus*. Of these, *Th. nigerianus* was the predominant species and the only one found infected with *D. medinensis* larvae, the infection rate being 5·1 per cent., and the maximum number of larvae per cyclops being two. Measured quantities taken from four different

parts of the pond, two on the surface and two at the bottom, revealed that the largest number of cyclops (506 in 10 litres) occurred at the bottom (2 feet deep) of the most used part of the pond, and that the highest infection rate (10·5 per cent.) occurred in those taken from the surface of this part of the pond. Only adult females, mostly lacking egg sacs, were found infected.

At the end of the rainy season, in September 1950, a second survey was carried out on the same lines as previously and the results are compared. A house-to-house examination of the villagers showed no cases of active guineaworm infection at this period, the only evidence being the presence in 20 people of hard swellings at the knee joint, ankle and wrist, which were apparently due to dead worms. Water sampling produced an estimated total of 189 *Th. nigerianus* in 40 litres of water, a marked reduction in density as compared with the 817 in 40 litres collected in the dry season ; and of 989 examined none was infected. Other sources, a well and another pond were examined but no infected cyclops were found. Observations were also made on the numbers of villagers who daily collected water at a well (dry during the dry season), at the pond under investigation and at a second pond overgrown with vegetation which was little used during the dry season. The well was the most popular source of water, on account of its proximity to the houses and the ease of collecting.

It is concluded that the great majority of infections of the human and cyclops populations occur during the dry season, and it is thought that this seasonal incidence is closely related to the nature of the water supply, and it may vary greatly in villages in the same area. *J. J. C. Buckley*

Alicata, J. E. & Ricci, M. Ricerche sulla trichinosi in Italia. [**Research into Trichinosis in Italy.**] *Riv. di Parassit.* Rome. 1951, Apr., v. 12, No. 2, 113–18. English summary.

A parasitologist from Honolulu and another from Rome are joint authors of this paper which includes brief notes of outbreaks of human trichinosis which occurred in Volpino (Northern Italy) in 1917 and in Sicily in 1933, 1942, 1945 and 1946, with fatal cases in each outbreak except the last. A search for the larvae of *Trichinella* has now been carried out in the masseter muscle of 1,545 pigs, in this muscle and in the diaphragm of 53 rats and 27 mice and in specimens from 127 human diaphragms. Human, pig and rodent specimens were obtained and examined in Sicily (Palermo), Rome and Northern Italy (Como and Milan). In no case could *Trichinella* be demonstrated. Reference is also made to an equally fruitless search made by the " trichinelloscope " among 290,000 hogs handled by firms in Palermo, Rome and Como. It is, therefore, still uncertain how the pigs which must have caused the various human outbreaks came to be infected, though rodents are believed to have been responsible. *J. Cauchi*

Beard, R. R. **Incidence of *Trichinella* Infections in San Francisco, 1950.** *J. Amer. Med. Ass.* 1951, May 26, v. 146, No. 4, 331–4, 1 chart.

" Fifty gram portions of diaphragms from 161 unselected autopsies done in San Francisco between November 1949 and June 1950 were examined for larvae of *Trichinella spiralis* by digestion with pepsin and hydrochloric acid. Thirteen (8 per cent) contained parasites. This contrasts with the finding of 24 per cent in a series of 200 autopsies, studied by the same method, reported by McNaught and Anderson in 1936. This is attributed to the lessened use of garbage-fed pork, more stringent regulation of the production of ready-to-serve pork foods and public education on the necessity of cooking pork."

ROTH, H. Nuevas experiencias sobre la triquinosis con especiales consideraciones sobre su existencia en las regiones árticas. [**Trichiniasis, with special reference to its Existence in the Arctic Regions.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 352–75, 1 map. [40 refs.]

After some general remarks on infestation by *Trichinella spiralis* and its diagnosis by the Bachman precipito-reaction, deviation of complement and other methods, the author (who writes from Denmark) quotes the findings of Professor AASER of the Veterinary Institute, Norway. Of 94,959 foxes examined between 1940 and 1947, 4,488 (4·7 per cent.) were infested ; of 3,806 mink, 299 (7·8) ; of 125 wild red foxes, 28 (22·4) ; other infested animals included badgers, cats, dogs and rats.

Greenland then comes up for special consideration from the time, in 1909, when BOHM recorded a heavy infestation in polar bears. A line map indicates the places where trichiniasis occurs in man, dog, white bear, wolf, walrus and seal. A list is given of 22 species of animals examined between the spring of 1948 and the 8th February, 1950 ; altogether 1,489 of which 189 (12·7 per cent.) were infested. Polar foxes constituted the largest single species examined, 264, but only three were positive ; dogs came next, 227, but of these 151 (66·5) were positive ; none was infested among 210 sheep examined and only two out of 207 walruses ; of white bears, however, 31 out of 112 (27·7) were infested. Reference is made to records from northern Canada, the Behring Straits and districts outside Greenland. Human infestation does occur, but only among travellers, explorers and those indigenous people who happen to consume the flesh of animals uncooked or inadequately cooked.

H. Harold Scott

RAPPAPORT, I. & WELLS, Helen S. **Studies in Trichinosis. I. Immunity to Reinfection in Mice following a Single Light Infection.** *J. Infect. Dis.* 1951, May–June, v. 88, No. 3, 248–53, 3 figs.

" 1. Experiments are presented which demonstrate various manifestations of immunity in experimental trichinosis. Mice were infected with 100 larvae initially, and then given a single reinfection with 800 larvae after 10 or 36 days, 3·5 months, or with 300 larvae after 35 days.

" 2. Adult worm counts during the course of the intestinal phase did not show significant differences between reinfected and control animals when the number of larvae fed was 800, a dose which is just sublethal. When mice were reinfected with 300 larvae 35 days after the initial infection, there was a loss of adult worms beginning early in the second week of reinfection.

" 3. Adult male and female worms were significantly shorter in length in reinfected animals. The uteri of these female worms appeared sparsely filled with eggs and embryos.

" 4. The larval phase in the musculature for the 800 larvae infections indicated the lowest immunity after 10 days and the highest immunity after 36 days. The most striking manifestations of immunity were obtained in reinfections after 35 days with 300 larvae.

" 5. It is believed that the low larval yield in the musculature, in spite of high adult worm yields, results mainly from the stunted growth and diminished fecundity of female worms in intestines of reinfected mice.

" 6. The least significant manifestations of immunity were obtained with a duplicate series reinfected after 3·5 months with 800 larvae. The reason for these atypical findings is not known. These and other atypical findings

such as consistently poor adult yields in previously uninfected animals indicate that the degree of infectivity of larvae may vary from one experiment to the next.

"7. The utilization of several quantitative criteria in the study of immunity in trichinosis is emphasized and may explain the conflicting results of other workers."

MINNING, W. & DING, P. C. Hetrazan-Wirkung bei Mäusetrichinose. [**The Action of Hetrazan in Trichiniasis of Mice.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 103–8.

The English summary appended to the paper is as follows :—

"Effect of Hetrazan was studied in mice which were infected with 100 trichinella larvae each. Groups 1 and 2 were given 300 mg/kg and 600 mg/kg respectively three times daily for 5 days ; both groups were started on drug treatment 24 hours after infection and killed 24 hours after the last dose. They showed fewer intestinal trichinas than control mice. In group 3, with treatment beginning 6 days after infection, this reduction was less evident. Autopsies of group 4, treated as group 1 and killed 36 days after, did not allow definite conclusions as to the effect of Hetrazan on young and muscle trichinellas."

ERRATA

In the abstract of the paper by PINTO [this *Bulletin*, 1950, v. 47, 1004] the statement that the total number examined was 403 should have referred only to one group of infants. The 502 formed a separate group, but the point is not easily appreciated in the original. The numbers examined and reported on in relation to age and sex should read 69 and 100 instead of 20 and 31 ; the latter figures are of infants only. The snail *Pyrgophysa* (*Bulinus*) *forskali* was found to be attractive to cercariae of *S. haematobium*, but, as stated in the abstract, it was not found infected by furcocercariae in nature. It is only an assumption, therefore, that it is the intermediate host.

In the abstract of the paper by BACKHOUSE and HEYDON, 1951, v. 48, 386, the words "*Aëdes pseudoscutellaris*" on the second line of p. 387 should read "*Aëdes scutellaris*".

DEFICIENCY DISEASES

BEET, E. A. **Observations on African Children.** *Arch. Dis. in Childhood.* 1951, Apr., v. 26, No. 126, 119–33, 1 sketch map. [15 refs.]

An account is given of a clinical examination of 660 unselected and apparently normal children of the Lala tribe of Northern Rhodesia. There was a high incidence of malarial infection and of infestation with hookworm and *S. haematobium*. The commonest clinical signs were xerosis of the arms and hyperkeratosis of the knees and cheilosis. The diet, judging by surveys, appeared deficient in calories and perhaps in animal protein, vitamin A activity and riboflavin. It is concluded that kaffir corn is at least as good a staple food as finger millet [for earlier work by the author in the same tribe see this *Bulletin*, 1951, v. 48, 66]. *R. Passmore*

FERRO-LUZZI, G. Problemi alimentari e fenomeni di malnutrizione in Eritrea. [**Food Problems and Evidence of Malnutrition in Eritrea.**] *Riv. di Biol. Colon.* Rome. 1949–50, v. 10, 27–66, 5 figs. & 4 graphs. [40 refs.] English summary.

A brief account is given of a nutrition survey carried out among 15 distinct groups of the African population of Eritrea, each group belonging to a different tribe or a different social class, each having its own separate mode of living and habits of feeding. Thus, one group is made up of highland peasants, other groups are salaried classes in the highlands, similar classes in the lowlands, beggars, priests, herdsmen, Danakils of the highlands, the lowlands and the coast. Except for 3 groups with nomad habits, more than 50 households were surveyed in each group, over 100 in some. The average individual daily diet for each group and the food values of each such diet are tabulated. [It is not made clear what unit of weight is referred to in each column of food values and whether the column headed Ca refers to carbohydrates or to calcium.] Another table gives the percentage food value of each foodstuff which is in common use in the country and the British sources of this information are acknowledged. Among condiments, dried red pepper is consumed in considerable amounts and cannot be left out when reckoning the nutrition value of the diet. The various native alcoholic drinks are briefly described but their composition varies too widely for a statement of their percentage composition or the quantities in which they are consumed to be attempted : they are prepared by fermenting various cereals and honey. Generally speaking, the diet is deficient in riboflavin and vitamin A ; a deficiency of vitamin D is probably compensated for by the abundant sunshine. The native diet can be described as mainly vegetarian, bulky, and lacking in variety, in caloric value, in fats and in those proteins which are of animal origin and which contribute the more biologically valuable kind of amino-acids.

Food production is insufficient for the needs of the people and must be supplemented by the import of cereals. The vicious circle of malnutrition→ substandard health→ poor agricultural effort→ food deficiency→ malnutrition is at work, while the high incidence of endemic disease is both cause and effect of this state of affairs. The methods of farming are primitive, seed selection and artificial manuring are virtually unknown, mechanical aids are not available, grain or other food storage is hardly developed and there is no reserve kept to meet the scarcities due to season, plant disease, drought, or invasions by locusts. In a famine, locusts have proved a useful article of food and their percentage composition is included in the table of food values.

A wide variety of signs and symptoms of deficient nutrition are met with and are referred to in this paper, and a number of measures are recommended which aim at raising the production of food and the standard of nutrition.

[The paper which is summarized here is a brief report of the survey referred to. It includes too many figures to allow of their inclusion in this abstract.]

J. Cauchi

PIERAERTS, G. Syndrome de dépigmentation-oedème (Kwashiorkor) au Kasaï. Essais thérapeutiques (IV). [**The Syndrome of Depigmentation-Oedema (Kwashiorkor) at Kasaï. Therapeutic Trial (IV).**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1505–15.

Amigen, a preparation of ten essential and nine non-essential amino-acids, obtainable from Mead Johnson & Co., Evansville, Indiana, U.S.A., is suitable after dilution with physiological saline and resterilization for subcutaneous

infection in infants and children, 3 to 8 years old, suffering from kwashiorkor. Most cases received in 10 days up to two or three litres of an Amigen solution, containing 5·25 gm. of nitrogen per litre. In mild cases there follows a definite improvement, but no more than is usually obtained with milk. In severe cases neither milk nor amino-acid has any therapeutic value. It is the extent of the oedema that determines the response and in this respect the other symptoms are less important. When the oedema reaches a certain stage, the ability to respond to milk and amino-acids is lost. This incurability (or malignancy) can only be reversed by giving human proteins in the form of human serum. Either fresh or reconstituted dried serum may be effective, but large doses, up to one-tenth of the body weight, may be necessary. It is concluded that in these severe cases the fundamental lesion is an inability to synthesize the body proteins. If these can be supplied, then recovery from the other lesions is possible. *R. Passmore*

HAEMATOLOGY

LINHARD, J. Notes sur les hématies falciformes. [**Observations on Sicklaemia.**] *Bull. Méd. de l'Afrique Occidentale Française.* 1951, v. 8, No. 1, 37–40.

While there is a considerable British and Belgian literature on the subject of sicklaemia in Africans, the author has been able to trace few statistical records relating to this question in the French African territories.

He has accordingly studied this phenomenon in 2,500 people in Dakar, covering many different tribal groups from French West Africa. All were Africans, with the exception of a few of mixed breed.

There were two groups of subjects, one consisting of 690 civilians and 400 soldiers, all originating from over a wide area of French West Africa, and the other of 1,410 schoolchildren representing almost pure stocks and derived largely from the Ouolof and Lébou tribes.

Among these 2,500, he found 191 cases of sicklaemia (7·6 per cent.). Among 1,490 adults there were 11·5 per cent. positive and among 1,010 children there were 4·9 per cent. There were 8·2 per cent. positive out of 1,754 males and 6·3 per cent. out of 756 females.

The predominance of adult males among the positive groups is attributed to the number of military subjects, many of whom were natives of Guinea. The latter group showed a higher degree of sickling (19 per cent. of 205) than did the Soudanese (6·6 per cent. of 2,295).

There seemed also to be differences in incidence between the pure and mixed populations. There were apparently some tribal differences, for example the Foulah or Peuls and the "Toucouleurs" showed a percentage incidence of sicklaemia amounting to 10 to 13·3 per cent. Another point of interest was a clear difference in the curve of incidence between the Ouolof and the Lébou, who are regarded as being closely related tribes: this difference, the author suggests, indicates that they may not be so closely related as has been believed hitherto.

He suggests that studies should be made correlating the incidence of sicklaemia with other haematological and anthropological factors. He has himself studied it in relation to blood groups. In those belonging to Group AB, there was an incidence of 11·53 per cent. while in the other three groups it was between 7 and 8·3 per cent.

It is stressed that these studies are preliminary and will require confirmation on a large scale: such systematic study is being undertaken, including that of all African blood donors whom the author sees.

Finally, it is recorded that in 88 cases of anaemia seen by the author in the last year, there were 8 in which he found "*des hématies falciformes pouvant peut-être expliquer la cause de ces anémies*". He notes that Anglo-Saxon authors record only about 1 per cent. of carriers of the trait showing signs of sickle-cell anaemia [see, for example, RAPER, this *Bulletin*, 1950, v. 47, 655].

H. J. O'D. Burke-Gaffney

MOONEY, F. S. **Cooley's Anaemia in a Maltese Child.** *Arch. Dis. in Childhood.* 1951, June, v. 26, No. 127, 231–4, 4 figs. [41 refs.]

"Cooley's anaemia in a Maltese child is described.

"The presence of methaemalbumen in the plasma is recorded, and its significance discussed."

de SILVA, C. C. & WEERATUNGE, C. E. S. **Cooley's Anaemia in Sinhalese Children.** *Arch. Dis. in Childhood.* 1951, June, v. 26, No. 127, 224–30, 9 figs. [16 refs.]

"Four cases of Cooley's anaemia are reported from Ceylon in male Sinhalese children.

"The two older patients showed marked radiological changes in the skull, long bones, and metacarpals and phalanges. The blood changes were typical."

LIU, Chi-hsiong, CH'EN, Wen-chieh & KOO, Kuo-hao. **Mediterranean (Cooley's) Anemia with Marked Bone Changes in a Chinese Female of 16½ Years. Report of a Case.** *Chinese Med. J.* Shanghai. 1950, July–Aug., v. 68, Nos. 7/8, 203–10, 6 figs. on pl. [42 refs.]

VENOMS AND ANTIVENENES

MOUNTER, L. A. **The Specificity of Cobra Venom Cholinesterase.** *Biochem. J.* 1951, Aug., v. 49, No. 3, Proc. Biochem. Soc. xlv–xlvi.

VACHON, M. Etudes sur les scorpions. [**Scorpion Investigations.**] *Arch. Inst. Pasteur d'Algérie.* 1951, Mar., v. 29, No. 1, 46–104. figs. 637–97. [Bibliography.]

This is the final chapter summarizing the author's studies on the scorpions of North-West Africa. It is of interest mainly to the zoologist and the systematist. In a line map the author divides the area involved into five sectors and he has described 14 genera, 33 species and 56 subspecies. The fauna differs considerably in the different sectors. Thus, the Sahara sector furnished 10 genera and 18 species or subspecies, whereas the Morocco sector had 7 genera and 25 subspecies. The five sectors are designated: Numidian or Algero-tunisien, Moroccan, Sahara proper, Hilly Sahara, and Sarhelian.

Each of these sectors is discussed in turn and under each the following points are considered: the families, genera and species and keys of their morphological characters and the more minute points for distinguishing the genera, species and subspecies, with drawings of the caudal extremities and in some cases of the legs. These are followed by a table of the current synonyms, the old and the modern revised names and a list of those which may be more or less identified by their colours, black, light or dark brown, and yellowish, in the different geographical sectors.

H. Harold Scott

WOLFE, E. D. B. **Death from the Bite of a Spider.** *Med. J. Malaya.* 1951, June, v. 5, No. 4, 375.

A Malay girl aged 10 attempted to rescue a young mouse which was being attacked by a so called " bird-eating " spider and in so doing was herself bitten by the spider in the little finger of the right hand.

About an hour later she became unconscious and some five hours later had three fits of about three minutes duration and died within half an hour. There is no information as to the previous state of the child's health.

The spider measured from 2 in. to 2½ in. long with a span of 4 in. across the legs. It was " a repulsive looking creature covered with thick velvety hair ". The abdomen was " about the size of a sparrow's egg ". It was evidently a spider of the Sub-Order Mygalomorphae, but could not be identified further.

It is stated that one of the commonest members of this Sub-Order is *Lampropelma violaceopedes*, fam. Aviculariidae [tarantulas]. The venom is injected through piercing stylets about ½-in. long situated near the mouth. The bite of these spiders is very painful and accompanied by much local swelling but death in such cases is extremely rare.

The author refers to a case made known to him by a Provincial Commissioner in Malaya, in which a healthy adult European was bitten in the finger : pain and swelling were considerable for an hour or two, but recovery was complete.

H. J. O'D. Burke-Gaffney

DERMATOLOGY AND FUNGUS DISEASES

NEGRONI, P. Estudios sobre el *Coccidioides immitis* Rixford et Gilchrist. VIII. Estudio citológico. [**Studies on** *Coccidioides immitis*. **VIII. Cytological Study.**] *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1949, v. 14, No. 1, 299–305, 4 figs. on 2 pls. English summary.

This paper deals with the finer morphological features of *Coccidioides immitis*, and is supplementary to the detailed description of the fungus by BAKER, MRAK and SMITH.

NEGRONI, P., VÍVOLI, D. & BONFIGLIOLI, H. Estudios sobre el *Coccidioides immitis* Rixford et Gilchrist. VII. Reacciones inmunoalérgicas en la infección experimental del cobayo. [**Studies on** *C. immitis*. **VII. Immunoallergic Reactions in Experimental Infection of the Guineapig.**] *Rev. Inst. Bacteriológ. Malbrán.* Buenos Aires. 1949, v. 14, No. 1, 273–86, 5 figs. on 3 pls. [15 refs.] English summary.

In this study on experimental allergy and immunity, five groups of guineapigs were used. Three groups labelled A, B and C were inoculated, respectively, by the subcutaneous, intramuscular and intraperitoneal routes with living spore suspensions of *Coccidioides immitis*. Animals of group D were not infected at first but were given vaccinal injections of a heat-killed (65°C. on water bath for 30 minutes) spore suspension three times weekly for a month, by the subcutaneous, intramuscular or intraperitoneal routes. Animals of group E were not given any preliminary infective or vaccinal injection.

The infected animals of groups A, B and C developed dermal hypersensitivity which could be demonstrated by the coccidioidin skin test, with undiluted coccidioidin, at the end of a week from the time of infection, but

this state of allergic sensitivity was more marked at the end of the second week. Animals in group D, inoculated only with the killed spores, did not develop allergic sensitivity.

Tests for specific serum antibodies in groups A, B and C gave entirely negative results during the first few weeks of infection but at the end of 3 months the sera of 4 of the animals gave strong complement-fixation reactions with the coccidioidin antigen, although neither agglutinin nor precipitin was demonstrable in the sera. Other guineapigs infected with *C. immitis* but not included in the present experiment developed complement-fixing antibodies but not agglutinin or precipitin, after 9 to 12 months.

From 20 to 43 days after the beginning of the experiment, each of the five groups of guineapigs was divided into two subgroups one of which was inoculated intratesticularly with living spores of *C. immitis* and the other with heat-killed spores. One half of the animals in each subgroup were sacrificed 18 to 20 hours after intratesticular inoculation and the remainder were sacrificed at the end of 5 days. Histological examinations of the testicular and other tissues were made in all cases.

Animals of groups A, B and C, which were specifically sensitized and partly immunized, reacted strongly to the intratesticular injection of living spores, and the testes showed haemorrhagic foci with marked cellular infiltration of monocytes and polymorphonuclears, and nodular formations of histiocytes. The spherules of *C. immitis* in these lesions were small and scanty, showed no endospores, and sometimes presented hyaline, acidophile processes on their surface. There was definite evidence of destruction of the fungus. The animals of groups A, B and C inoculated intratesticularly with heat-killed spores showed exudative, necrotic lesions of the testis with congestion and haemorrhage which, however, had greatly diminished by the fifth day. Animals of group D, which were neither sensitized nor immunized by the injections of heat-killed spores, developed progressive lesions from the intratesticular injection of living spores and showed, in these lesions, a great abundance of first-infection parasitic sporangia of the fungus filled with granular endospores. Animals of this group inoculated intratesticularly with heat-killed spores, showed testicular congestion and discrete monocyte infiltration. Animals of group E behaved like those of group D to the two kinds of intratesticular injection except that the killed spores caused only a meagre, nodular interstitial reaction in the testis.

J. T. Duncan

TROPICAL OPHTHALMOLOGY

Falcone, G. Le manifestazioni oculari di malattie generali in Somalia. [**Eye Conditions due to General Disease in Somaliland.**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1951, Mar., v. 32, No. 3, 195–8.

About a quarter of the cases of eye disease seen in the Civil Hospital of Mogadishu in the 2 years 1949 and 1950 are reported to have been connected with general disease. Altogether, 333 patients were suffering from lymphatic (phlyctenular) kerato-conjunctivitis ; about 30 per cent. of these were in their early twenties and showed associated involvement of the lymphatic glands or the bones (*e.g.*, Pott's disease) : 28 patients had xerosis due to deficiency of vitamin A : 45 patients had herpetic keratitis ; a search for the malaria parasite is indicated in such patients, who often recover when their malaria is treated : 162 patients showed corneal degeneration and this was often found to be due to a combination of parasitic disease, such as amoebiasis and ankylostomiasis, and climatic factors, such as wind, dryness, heat and dust.

Three hundred and fifteen patients suffered from inflammatory conditions of the uveal tract, mostly due to an attack of relapsing (tick) fever or to syphilitic infection which had either received no treatment or been insufficiently treated : in many of these cases, however, no specific cause could be traced. One hundred and fifteen patients had disease of the retina and the optic nerve, also often due to relapsing fever or to syphilis. Five hundred and seventy patients had disease of the lens, mostly senile cataract. There were 124 cases of glaucoma and 85 of degeneration of the whole eyeball from septicaemic infection, all believed to have been associated with general disease. The ocular complications of leprosy, smallpox, yaws, leishmaniasis, dengue and other infections are referred to in this paper. *J. Cauchi*

Castesana Garcia, M. Factores Epidemiologicos y Epidemiologia del tracoma en España. [**Epidemiology and Epidemiological Factors of Trachoma in Spain.**] *Med. Colonial.* Madrid. 1951, Aug. 1, v. 18, No. 2, 122–39, 6 figs.

The author introduces his paper by historical references to trachoma, to the Ebers papyrus of 2500 B.C., to the Talmud which speaks of it among builders of the pyramids ; to the writings of Susruta, Hippocrates, Herodotus (in the Peloponnesian war) and the wars of Alexander ; to the recordings of Celsus at Rome and naming many illustrious sufferers from trachoma—Horace, Pliny, Cicero, Hannibal and St. Francis of Assisi.

In Spain, the southern and eastern parts are chiefly affected ; parts below a line extending from Gerona in the east, through Badajoz to the boundary with Portugal, and including Barcelona, Alicante, Murcia, Malaga, Seville and Cadiz, and, to the west of this line, Madrid. The infection, it is said, was introduced by miners and fishermen from Almeria. The peaks of infection, 17·9 per mille, occur in Almeria and Murcia ; a graph shows the numbers per mille for each of 25 towns.

The chief epidemiological factors are : 1. *Poverty* (*miseria*), including overcrowding, tending to spread infection. But later the author states that there is no correlation between density of population and incidence of trachoma, though there is a familial association [see below]. 2. *Occupation*, especially workers with esparto grass, in which the poorest are engaged, and miners who work in unhealthy surroundings. Also fishermen along the Mediterranean littoral, living in squalor. Among these some 60 per cent. suffer from trachoma. 3. *Climate* ; dry and clear, with a mimimum rainfall, as in north Africa, Spanish Morocco, Tunis, Egypt and the Mediterranean countries.

Coming more particularly to Spain itself, trachoma is most rife in places where there is poverty and dirt, *e.g.*, parts of Murcia where among 400 persons examined, 236 (59 per cent.) were trachomatous. Of this total 203 were males, 197 were females ; 51·8 per cent. of the former and 66·6 per cent. of the latter were infected, and 70 per cent. of those between one and four years of age.

As regards familial association referred to above ; among families in which both parents were infected 85·3 per cent. of the children were trachomatous ; where the mother was infected but the father was not, 80 per cent. ; where the father and not the mother was infected, 60 per cent., and where neither parent was positive only 17 per cent. of the children were trachomatous.

Among fishermen of Aguilas, of 661 examined, 414 (62·6 per cent.) were infected ; 359 were males, of whom 256 (71·3) were positive, and 302 were females of whom 158 (52·3, not 71·3 as stated) were infected. Among infants the incidence was 62·9 per cent., but among adults the figure increased to 86·7 per cent. ; this was almost confined to the males and is, consequently,

ascribed to their occupation. Where both parents were infected the percentage among the children was 66·59, whereas when the mother was infected but not the father the percentage was a little higher (66·76) ; with father positive and mother negative 41·1 per cent., and with both parents negative 46·5 per cent. This would favour the view that it is the occupation and not familial infection that is the main factor.

Lastly, in the town of La Raya (Murcia) it is stated that 348 families comprising 1,447 individuals were examined and figures are given of the results for the totals and by sex, but the figures seem to be very mixed [and all but one of the calculations are wrong] so it would be useless to record them here.

In his summing up, the author shows that by far the heaviest infection is among those working with cane and esparto grass, 64·1 per cent. in males and females alike, and this he ascribes, in great part at least, to moulds, penicillium and aspergillus, which develop on the cane and act as irritants and cause conjunctivitis, " a soil on which trachoma readily develops ".

H. Harold Scott

TABONE, V. **Anti-Trachoma Campaign in Gozo.** *Brit. Med. J.* 1951, Apr. 7, 738–40.

An intensive anti-trachoma campaign on the island of Gozo (near Malta) is discussed by Tabone. The island has a population of about 28,000 spread out in the only city and in twelve villages.

In all, 4,058 schoolchildren were seen, and of these 721 were found suffering from trachoma and 270 from " conjunctivitis ". Doubtful cases were labelled non-committally " conjunctivitis ", about half of such cases later proved to be trachoma. Examination of the members of families of affected children revealed that 926 contacts were actually suffering from trachoma. In a house-to-house examination of all persons on the island, out of 12,698 examined, 612 had trachoma. The incidence of the disease is greatest among schoolchildren.

In the investigation no definite proof that the fly is responsible for the spread of the disease has been forthcoming, although the insect is ubiquitous in Gozo.

Treatment was free and consisted in giving full doses of sulphonamides by the mouth for one or more periods of 10 days each, the instillation of sodium sulphacetamide drops (30 per cent.) at least 3 times each day, and the application of sodium sulphacetamide ointment (6 per cent.) at night. The campaign has yielded very good results, especially in respect of schoolchildren. In two years only 6 out of 721 cases remained under treatment. *E. O'G. Kirwan*

MASSOUDA, G. **Report on the Treatment of Trachoma with Subconjunctival Injections of " Solufontamide ".** *Medicine & Laboratory Progress.* Cairo. 1950, Sept., v. 11, No. 9, 225–8.

Twenty patients in Cairo suffering from active follicular trachoma (corresponding to the type 2a of MacCallum's classification) were treated by the author, with Solufontamide. This drug is a soluble derivative of Fontamide. The dose injected subconjunctivally was a $\frac{1}{2}$ to $\frac{3}{4}$ of a cc. of the 33 per cent. solution and injections were given once weekly for 6 to 9 weeks. The solution was injected along the upper border of the tarsus after previous local anaesthesia of the conjunctiva.

These subconjunctival injections have proved successful in 75 per cent. of he series [presumably 15 patients] and the drug was found to be an excellent ubstitute for the classical treatment and a valuable addition to anti-trachoma herapy. *E. O'G. Kirwan*

PIJOAN, M., LOE, F. & PAYNE, E. H. **Chloromycetin in the Treatment of Trachoma.** *J. Trop. Med. & Hyg.* 1950, Sept., v. 53, No. 9, 193–7. [14 refs.]

Chloromycetin (chloramphenicol) in the treatment of trachoma among Indians of the South West of the U.S.A. is discussed by the authors.

Twenty-three patients were selected from the following reservations : White River Apache, Hopi and Navajo. These comprised a group of subjects living in different areas, living under somewhat different conditions, consuming different foods, but having presumably the same eye disease.

Chloromycetin was administered orally, 3 gm. being given to adults in divided doses at 3-hour intervals for the first 24 hours. The dose was then continued at a rate of 250 mgm. every 3 hours. Correspondingly smaller doses were given to children. Within 24 hours, most of the photophobia and lachrymation were considerably reduced and within the next few days there was a remarkable reduction in inflammation and a clearing of the exudate in the cornea.

The patients were observed for three months or longer without evidence of relapse. *E. O'G. Kirwan*

ELLIOTT, D. C. **Effect of Aureomycin in Ocular Complications of Leprosy.** *Amer. J. Ophthalm.* 1950, July, v. 33, No. 7, 1029–33.

The effect of aureomycin in ocular complications of leprosy is discussed by the author.

In a group of 30 patients with leprosy and ocular complications resulting from both the leprosy and the secondary invading organisms commonly found in the conjunctival sacs, Elliott found improvement of an unusual degree both clinically and bacteriologically following the instillation of aureomycin ophthalmic solution.

The solution is prepared by the addition of 5 cc. of distilled water to 25 mgm. of aureomycin, 25 mgm. of sodium borate and 62·5 mgm. of sodium chloride. The solution must be made up and used within two days' time. One or two drops were instilled twice daily, and even when they were applied not more than once daily, the number of secondary invading organisms was effectively reduced. In one patient, aureomycin by the mouth seemed to alter decidedly the course of an attack of leprous iridocyclitis. This patient received 2,000 mgm. for 24 hours, two capsules of 250 mgm. each given four times in the period.

E. O'G. Kirwan

SARKIES, J. W. R. **Ophthalmoscopic Detection of Microfilaria of** *Onchocerca volvulus*. *Lancet.* 1951, June 2, 1205–6.

Many workers have described the observation of microfilariae in the aqueous humour of the eye with a slit lamp and corneal microscope.

Sarkies describes a technique by which microfilariae could be seen in the aqueous humour with an ophthalmoscope incorporating a plus 20 D to a plus 28 D lens, held 3·5–5·0 cm. from the centre of the anterior chamber, *i.e.*, at the focal distance of the lens used. The whole of the pupillary area is illuminated by reflection from the fundus ; and since the embryos are seen in silhouette, the margin of focus is greater than with a corneal microscope and direct illumination from a slit lamp. For this reason the embryos can be recognized more rapidly, and in cases where they are scanty, are less likely to be missed with an ophthalmoscope. The eyes are examined under a mydriatic, first with an ophthalmoscope and then with a slit lamp. The ophthalmoscope is brought

towards the eye with the light directed on the optic disk until the pupillary margin of the iris comes clearly into focus. At this point microfilariae can be seen, if present, silhouetted against the illuminated pupil as tiny black threads swimming through the aqueous humour with a rippling motion ; this motion is quite characteristic and differentiates microfilariae from other opacities, *e.g.*, cells in the aqueous, threads of persistent pupillary membrane, and small particles floating in the lachrymal secretions on the anterior surface of the cornea. Of 55 persons with embryos in the aqueous humour, these could be seen with an ophthalmoscope in 54, whereas with a slit lamp they were seen in only 35.

When microfilariae are scanty, ophthalmoscopy offers a great chance of success. In remote areas of Africa, where the disease is prevalent, the simplicity of the apparatus has obvious advantages ; for the doctor in such regions it provides a rapid means of diagnosing ocular involvement in the earliest stages.

E. O'G. Kirwan

TROPICAL ULCER

Dixon, D. S. **Ulcers in African Labour.** *East African Med. J.* 1951, May, v. 28, No. 5, 214–16.

The author writes from a group of tea estates in Kenya. Figures are given for ulcers (which are not differentiated) occurring between 1931 and 1950 in the African labour force, which has grown during that period from 4,000 to 10,000. In the same table corresponding figures are given for wounds.

The numbers of ulcers per 1,000 men in 1931–1935 were respectively 233, 44, 17, 6 and 8. Conversely the incidence of treated wounds rose from 362 to 905. It is pointed out that the recruitment of labourers with present or scarred ulcers is avoided : and that it was made the responsibility of gang headmen that no member of a gang should work if he had an untreated wound or abrasion. This largely explains the fall in the incidence of ulcers and the increased numbers of treated wounds.

The number of ulcers per 1,000 varied between 4 and 34 until 1948, when there was an alarming increase to 110 per 1,000. In that year it was noticed that at the end of the dry season and the early part of the rainy season, the increase in the number of ulcers was striking. This was thought to be due either to dietary deficiency owing to lack of rain or to seasonal work such as pruning tea bushes. In the latter case, a proportionate increase in wounds would be expected ; but monthly figures shown in a table indicate that no such increase occurred.

The dietetic factor was therefore regarded as the more likely cause of the increase in ulcers at the end of the dry weather. For 20 years attempts had been made to provide a properly balanced diet containing animal protein, but this could not be obtained in such large quantities. However, in 1948 instructions were given to all estates to grow green vegetables and carrots for issue to their labourers in the dry weather. Each man also had two oranges a week. In 1950, ½ pint of whole milk was issued daily. In 1949, the number of ulcers fell to 58 per 1,000 and in 1950 to 20.

H. J. O'D. Burke-Gaffney

MISCELLANEOUS DISEASES

ADANT, M. & BOXUS, V. Les épreuves fonctionnelles du foie chez les coloniaux. [**Liver Function Tests in Colonials.**] *Ann. Soc. Belge de Méd. Trop.* 1950, Dec. 31, v. 30, No. 6, 1391–400.

The authors have investigated changes in serial "liver function tests" in a group of persons recently returned to Europe from the Belgian colonies, in an attempt to analyse the aetiological factors involved in liver disturbances grouped under the descriptive term "*foie colonial*". The "liver function tests" employed were: measurement of bilirubinaemia; the Takata, Hanger, Weltmann and Thymol turbidity reactions. Eighty persons of both sexes were examined unselectively within a few days of their return to Belgium. The results are tabulated as follows:

Tests	Number of Persons Examined	Number Positive	Per cent. Positive
Bilirubin	69	47	68
Takata Jetzler ...	74	12	16
Hanger	75	14	19
Thymol-Test ...	71	32	45
Weltmann ...	30	3	6

The findings are discussed. Sixty-one per cent. of those examined presented some abnormality in one or more of the tests to which they were submitted. The aetiological factors remain obscure. A previous malarial history was present in about the same proportion of those showing deviations from normal and those showing no changes. *B. G. Maegraith*

MAIER, E. H. Die akute tropische Myositis. Versuch einer Theorie über ihre Ätiologie. [**Acute Tropical Myositis. Suggested Aetiology.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 109–32, 1 fig. [62 refs.]

This is a long paper, with many references to the literature and a general consideration of the subject. The author's statements, apart from the quotations and references to other writers, are based on 300 cases seen in Fernando Po hospitals. Race is, he thinks, of little significance; at all events any racial influence is hard to gauge because the condition occurs where coloured races predominate and among men working on plantations or in agricultural pursuits. As regards age, those in the 3rd and 4th decades are mostly affected, but again this is the age of most plantation workers. Figures are quoted showing that in Japan most patients are in the second decade, in West Africa between 30 and 40 years; in Fernando Po 20–35 years, but one patient was between 12 and 14 years. Some writers have thought that more cases occurred in the rainy season, but this was not observed in Fernando Po. Other diseases present are malaria and helminthiasis, in particular filariasis, but also trichuriasis and ankylostomiasis, and amoebiasis. Among the author's patients all had malaria, 80 per cent. had hookworm and amoebiasis, 80 per cent. filariasis, especially *Loa loa*, and 50 per cent. had ascariasis.

The author goes on to state the results of examination of the pus and he found almost exclusively *Staphylococcus pyogenes aureus*, rarely *albus* ; filariae were never seen. He gives a brief account of the pathological anatomy and treatment. The latter comprises evacuation of the pus, administration of sulphonamides and injection of salicyl preparations.

In a concluding section the author discusses various theories of causation, staphylococcus, pneumococcus, filariasis, occupation and surface wounds, and offers the hypothesis that staphylococcus gains entrance by surface wounds and cutaneous lesions, sets up purulent dermatitis which extends to inflammation of the glands and the muscle tissues. The muscle and perimysial tissue are sensitized and respond to further staphylococcal invasion by fixation abscesses. As stated above, all the author's patients suffered also from malaria and he is of the opinion that malaria in chronic form by its effect on the reticulo-endothelium system predisposes to the disease in question. A diagram is presented in this paper purporting to explain this view. *H. Harold Scott*

FINDLAY, G. H. **Ainhum : with special reference to Involvement of the Fingers.** *Trans. Roy. Soc. Trop. Med. & Hyg.* 1951, June, v. 44, No. 6, 747–54, 3 figs. [20 refs.]

This is a most interesting and stimulating paper.

Whereas to most doctors familiar with the disorder, ainhum appears to be merely a band of fibrotic constriction of the affected digit, the author has shed possible new light on the aetiology of this peculiar malady, so common in the dark-skinned races. He refers to many interesting and original papers on the subject.

He divides ainhum into two types :—

(1) *True-ainhum* of either the toes or fingers.
(2) *Pseudo-ainhum* due to nerve damage in the affected part.

The common diseases producing the latter are neural leprosy, syringomyelia and possibly other nervous diseases, which involve the cord or peripheral nerves. In pseudo-ainhum there is no clinically evident hyperkeratosis at the site of the constriction. The author describes a patient with neural leprosy showing these ainhum-like constrictions on the left little finger and the right thumb and middle fingers.

True ainhum he regards as a naevoid tissue deficiency involving the epidermis, subcutaneous tissue and bone, the essential feature seen being the hyperkeratosis of the affected epidermis.

In ainhum of the fingers and toes there appears a disk-like zone of tissue, which reveals itself in this circular plate of defective tissue with an overlying keratoderma or hyperkeratosis. The author dismisses the popular concept of a fibroblastic diathesis peculiar to Negroes. He regards the constricting band and the keratoderma as essential to the syndrome, which is probably a hereditable disorder.

Ainhum of the fingers should more correctly be known as keratoma hereditarium mutilans Vohwinkel, or Vohwinkel's mutilating keratoderma. The little finger is always affected, the index one next in frequency and the thumb and third fingers on occasions. The fissure is always hyperkeratotic and keratodermas may be found elsewhere on the palms, soles and flexor surface of the fingers, and keratoses on the dorsa of hands and feet and over the knuckles, elbows and knees. The disorder has mostly been recorded in European girls, but the author adds, in this paper, a further example in a South African male Bantu aged 11, who had leprosy at the age of 4, but had completely recovered. The ainhum fissures were seen on four digits—on the proximal phalanx of the left third finger, the middle phalanx of the right

index finger and the proximal phalanx of the left fifth finger. The dorsal aspects of the hands showed several hyperkeratoses which were also clearly seen in the ainhum constrictions.

In ainhum of the toes, hyperkeratosis occurs in the fissure, and an associated keratoderma of the phalanx and sole may also be seen. Narrowing of the bone is usually present proximal to the level of the constriction ring.

The paper is beautifully illustrated by three clear photographs. Included is a full list of references. *M. Gelfand*

PROTOZOOLOGY : GENERAL

WESTPHAL, A. Abhängigkeit der Titerhöhe des Sabin-Feldman-Testes vom Methylenblau. [**The Relationship between the Titre of the Sabin-Feldman Test for Toxoplasmosis and the Methylene Blue Used.**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1951, June, v. 3, No. 1, 72–7.

The English summary appended to the paper is as follows :—

" Sensitiveness of Sabin-Feldman test for toxoplasmosis depends largely on the sort of methylen-blue. Using different commercial products one may see titers shift as much as 1 : 32 or five tubes of the test line. The brand of methylen-blue mostly used so far in German laboratories (Piekarski, Westphal) yields titers averaging four times, or two tubes, lower than those of American workers (Sabin, Frenkel). Titer figures should not be compared for clinical ends without taking into account said divergences. Based on the proportion 1 : 4, German results harmonize with those obtained in USA."

SUTTON, D. **Intracranial Calcification in Toxoplasmosis.** *Brit. J. Radiol.* 1951, Jan., v. 24, No. 277, 31–7, 8 figs. [15 refs.]

After reviewing shortly the literature on toxoplasmosis, the author reports 6 cases of this infection, 4 of which are reported for the first time. While several writers have taken the view that intracranial calcifications are rarely absent in toxoplasmosis and when typical are almost diagnostic of this infection, there are others, notably BINKHORST (*Toxoplasmosis*, 1948, Leiden, Stenfert Kroese) and NUTT *et al.* [this *Bulletin*, 1950, v. 47, 89] who claim that these are non-specific and of little diagnostic importance. The X-ray findings in these 6 cases are discussed with special reference to these divergent opinions.

Case 1 was an infant of 15 months with hydrocephalus, bilateral optic atrophy and chorioretinitis in one eye. The infant's complement fixation test was positive (4+) and also the mother's (3+) in 1 in 40 dilution.

Case 2 was a child of 2 years with a small head, impaired vision and bilateral chorioretinitis. The complement fixation test of the child and her mother were positive at 1 in 16 and 1 in 32 respectively.

Case 3 was a backward child of 2 years with convulsions, a squint and defective vision, hydrocephalus (19¾ ins.), microphthalmos, bilateral persistence of pupillary membrane and chorioretinitis of the right side. The complement fixation test was strongly positive at a titre of 1 in 256.

All these three cases showed calcifications in the form of multiple subcortical flakes scattered over both hemispheres and linear or curvilinear streaks, often in the basal ganglia ; these X-ray signs were considered diagnostic of toxoplasmosis.

Case 4 was a backward female of 20 years who had had convulsions and mental disturbances for the previous 18 months, raised cerebrospinal fluid

protein (100 mgm.), a grossly abnormal electroencephalogram suggesting severe affection of the basal grey matter—and *Toxoplasma*-neutralizing antibodies in the serum, but no chorioretinitis. She showed very marked symmetrical calcification in the basal ganglia and faint cortical calcifications in the parietal region.

Case 5 was a male of 18 years who had had left hemiparesis and left amblyopia from infancy : he was now complaining of frontal headaches. He had bilateral chorioretinitis and an old cortical lesion of the right parietal. The *Toxoplasma* complement fixation test was 3+ at a dilution of 1 in 20.

The X-ray showed flakes of calcification of the right parietal cortex and one centrally in the region of the right basal ganglia. These signs were at one time thought to be evidence of calcification of an angioma but this was excluded.

Case 6 was a male of 21 years who had had poor vision of the left eye since childhood and epileptic attacks during the last 2 years. He had chorioretinitis of the macula of the left eye which appeared to be set at a lower level than the right. The serological tests were positive and consistent with long-standing congenital toxoplasmosis ; the mother's complement fixation test was positive at 1 in 20 dilution.

The skull X-ray showed multiple scattered intracranial calcifications.

The X-ray findings in the last three cases, though not so typical as the first three, were considered to contribute valuable evidence to a diagnosis of toxoplasmosis.

The author considers that the viewpoint of Binkhorst and Nutt and his colleagues, that the skull X-ray picture is rarely specific, is untenable.

L. E. Napier

RATCLIFFE, H. L. & WORTH, C. B. **Toxoplasmosis of Captive Wild Birds and Mammals.** *Amer. J. Path.* 1951, July–Aug., v. 27, No. 4, 655–67, 7 figs. on 2 pls. [18 refs.]

" During a period of the past 10 years, 13 mammals and 14 birds developed fatal toxoplasmosis at the Philadelphia Zoological Garden. The disease is relatively rare, constituting less than 1 per cent of all deaths.

" With one exception, the form of toxoplasmosis encountered was acute, and in all instances involved organs of both the thoracic and abdominal cavities. Clinical signs of localization of the organisms in the central nervous system were lacking. The brains of 8 mammals and 3 birds of the series were closely examined at necropsy, and no lesions were found.

" The predominant tissue changes were foci of necrosis in liver, spleen, heart, lymph nodes, and lungs. The more acute lesions were accompanied by infiltration of monocytes. In less acute lesions, monocytes and fibroblasts largely replaced the necrotic tissue. In the lungs, diffuse interstitial infiltration of monocytes and edema usually characterized the disease, whether or not focal necrosis of the tissue had developed."

ENTOMOLOGY AND INSECTICIDES : GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

MATTINGLY, P. F. *Culex* (*Culex*) *torrentium* **Martini, a Mosquito New to Great Britain.** [Correspondence.] *Nature.* 1951, July 28, 172, 1 diagram.

Muspratt, J. **Notes on *Aëdes* (Diptera, Culicidae) from Natal, with a Description of a New Species of the Subgenus *Stegomyia*.** Reprinted from *J. Entom. Soc. of Southern Africa*. 1950, Sept., v. 13, 73–9, 1 fig.

The new species is named *Aëdes* (*Stegomyia*) *strelitziae* and it is closely allied to *Aëdes* (S.) *simpsoni*. It was abundant near Port Shepstone, Natal, and bred in the axils of wild banana, *Strelitzia nicolai*, sometimes with *Aëdes* (S.) *simpsoni*. The morphological characters of the two species are compared, those of the larvae being illustrated. The male, female, pupa and larva of *Aëdes* (*Aëdimorphus*) *bevisi* are also described. *H. S. Leeson*

Yates, W. W., Gjullin, C. M., Lindquist, A. W. & Butts, J. S. **Treatment of Mosquito Larvae and Adults with Radioactive Phosphorus.** *J. Econom. Entom.* 1951, Feb., v. 44, No. 1, 34–7.

[See also this *Bulletin*, 1950, v. 47, 1041 (*bis*).]

Zahar, A. R. **The Ecology and Distribution of Black-Flies (Simuliidae) in South-East Scotland.** *J. Animal Ecology*. 1951, May, v. 20, No. 1, 33–62, 5 pls. & 2 figs. [42 refs.]

Nájera, L. E. Nueva técnica para la creación y mantenimiento de colonias de " Phlebotomus ". [**A New Technique for the Breeding and Maintenance of Colonies of *Phlebotomus*.**] *Rev. Sanidad e Hig. Pública*. Madrid. 1950, Jan., v. 24, No. 1, 28–41, 8 figs. on 4 pls.

This is a fuller account, in Spanish, of the technique referred to in an earlier paper by the author [this *Bulletin*, 1951, v. 48, 415].

The author describes an apparatus which he used for breeding laboratory colonies of *Phlebotomus ariasi* during 1945–47. The chief features are as follows :—

A case 28–30 cm. long, 16–18 cm. wide, and 14–16 cm. high is open at the bottom and rests on a tray of damp, coarse sand. The ends of the case are of wood and include an organdie sleeve for access to the various objects inside. The remaining surfaces are glass, but one side has a wooden panel with a small glass sliding door which gives access to a small shelf projecting into the case.

Mounted on the damp sand within the case are two or more breeding chambers, each consisting of an inverted flower pot. Each pot is cut across horizontally about half-way up so that the upper portion may be removed like a cap. A few holes are bored in this upper part in addition to the usual hole found in the base of a flower pot. The lower part of each pot contains a solid layer or platform, about 1 cm. thick, of coarse sand embedded in sculptors' plaster. This mixture is inserted in the wet, workable, state after the pot is set on the sand of the tray, but it dries and sets quickly to provide the platform or base of the actual breeding chamber. Nutritive material consisting of fresh guineapig faeces with or without dried, powdered, blood and egg-yolk, is spread as a layer on top of the plaster platform.

The apparatus was kept at 25–30°C. and a high humidity was maintained by periodic wetting of the sand base on the tray.

Adult flies moved freely in the area of the case but withdrew through the holes in the upper pot to oviposit, and to shelter, in the dark, humid, interior of the breeding chambers. Young mice or rats (15–20 days old) in wire-mesh cages were left for 24 hours on the shelf within the sliding door and provided the source of blood-meals for the adults. Feeding occurred chiefly at night.

Larvae and pupae developed in the breeding material of the lower pot. Larvae which wandered over into the sand in the tray usually died, but a few pupated successfully.

The following time factors are given for the development of different stages of the life-cycle : incubation of eggs (2–3 days) ; development of larvae (12–16 days) ; duration of pupa (2–4 days) ; fertilization (2–3 days) ; ovulation (4–6 days) ; oviposition (2–3 days) ; giving a total time of 24–35 days for the life-cycle.

It was found that an irreversible diapause of fourth-stage larvae occurred during the winter months. They formed pupae in the spring and the normal life-cycle then proceeded for six summer months. Theoretically, there could be six generations in a year but the author obtained only three.

Good yields were obtained during the summer months. Within three months, one female had given a population of 382 adults ; initial cultures of 15 and 42 females established colonies of several hundred flies during the summer.

The author compares his results with those of UNSWORTH and GORDON [this *Bulletin*, 1946, v. 43, 1195] who obtained smaller yields of *P. papatasi* by a technique which, although differing considerably in practical detail, also aimed to simulate natural conditions in the laboratory for all stages of the sandfly culture. In the discussion of the two techniques, the present author attributes these low yields of *P. papatasi* largely to unobserved escapes of adults ; he found that the adults of *P. ariasi* were capable of escaping through double layers of organdie with an aperture of half to two-thirds of a millimetre.

The figures illustrate the apparatus developed by the author and also that used by Unsworth and Gordon. There are three photographs of a general nature of larvae and pupae in the breeding chambers.

[The two techniques differ sufficiently to account for differences in yield, and, moreover, the author appears to overlook the fact that he is comparing cultures of two different species of sandfly. The reviewer, who observed a good deal of the work on *P. papatasi* at the time, is not of the opinion that escapes occurred to the extent implied.] *D. S. Bertram*

LINDSAY, D. R. & HAINES, T. W. **A Method of Testing the Resistance of House Flies to Residual-Type Insecticides.** *J. Econom. Entom.* 1951, Feb., v. 44, No. 1, 104–6.

The resistance of wild flies to insecticides is usually tested by taking flies into the laboratory and breeding through one generation so that the adults used are reared under standard conditions and are of the same age as a susceptible laboratory colony. Several weeks elapse, however, before results are obtained by this method. In many cases it is useful to have a quicker method so that ineffective insecticides are not used in the field.

The authors suggest that flies collected in the field either in a modified cone net or in a sweep net may be transported to the laboratory in holding cages in an insulated box. In the laboratory, flies are fed with honey and water, and held in the cages for 18–24 hours during which time all weak or injured flies die. The flies are then anaesthetized with carbon dioxide, sorted into species and sexes, and exposed in insecticide-treated Petri dishes for periods of 20 to 30 minutes. After exposure the insects are anaesthetized once again and transferred to holding cages. Knockdown or kill may be recorded at any time interval. *C. M. Harrison*

DE COSTER, P. & RODHAIN, J. Localisation oculaire de nymphes de porocéphales chez un enfant indigène. [**Pentastome Nymphs in the Eye of an African Child.**] *Ann. Soc. Belge de Méd. Trop.* 1951, June 30, v. 31, No. 3, 331–5, 2 figs. on pl.

An African boy of 10 in Poko, Belgian Congo, was seen to have two small tumours, each the size of a cherry stone, on the conjunctiva of the right eye

one was situated on the upper and inner region, the other on the lower and outer region. They were stated to have been present for a year, but caused the child little inconvenience.

The tumours were hard, slightly pedunculated, and unattached to the eyeball. They were easily excised and the eyeball itself showed no trace of a lesion.

In the centre of each nodule was a living parasite, which proved on examination to be a nymph of *Armillifer armillatus*. Each parasite measured 25 mm. and there were 20 segments.

The authors discuss the literature on *Armillifer armillatus* and the arguments for and against its pathogenicity for man [see, for example, this *Bulletin*, 1924, v. 21, 791 ; 1947, v. 44, 136, 626]. In the present case, there was evidently a complete absence of any serious manifestation.

The route of invasion of the parasites is discussed. They are usually found in the abdominal organs but FORNARA [1924, *loc. cit.*] reported a case in which the parasite was found under the meninges. While the present authors consider that the internal origin of the parasites is probable in the case now reported, they suggest the alternative possibility that the emerging larvae may have become fixed directly to the conjunctiva through the medium of water infected with ova of *Armillifer*. *H. J. O'D. Burke-Gaffney*

PARENZAN, P. & CHIEFFI, G. Primo caso clinico di infestazione umana da *Linguatula serrata* in Italia. [**First Clinical Case of Human Infestation with *Linguatula serrata* in Italy.**] *Acta Med. Italica*. 1951, Mar., v. 6, No. 3, 67–9.

A woman, aged 28, with pulmonary tuberculosis, found a worm 3·3 mm. in length in her mouth on 3 successive occasions, in January, May and June. She preserved the last specimen in alcohol and this was identified a month later as a larva of *Linguatula serrata*, an Arachnid parasite. Previous human cases on record, both in and outside Italy, refer to cysts found post mortem. It is suggested that this patient had acquired the infestation either through eating salads containing the eggs, thus becoming an intermediate host, or from eating the undercooked rabbit or mutton (herbivorous animals) which carried the encysted parasite ; in the latter case the woman was a definitive host. The possible life-cycle within the human body is discussed by analogy with some other parasites. *J. Cauchi*

APPLEWHITE, K. H. & CROSS, H. F. **Further Studies of Repellents in Alaska.** *J. Econom. Entom.* 1951, Feb., v. 44, No. 1, 19–22.

The results of tests with repellents against mosquitoes and sand flies in Alaska are presented in this paper.

The predominant species of mosquito was *Aëdes communis*, but *Aëdes excrucians*, and *Aëdes pionips* were also prevalent. Of thirteen repellents applied to the forearm and leg of each of six subjects, dimethyl carbate and propyl N,N,diethylsuccinamate were the most effective. These two repellents gave protection times (*i.e.*, the time taken for the first bite to occur) of 85 and 101 minutes respectively. The repellent 2 phenoxyethylacetate, which was the next most effective, had a protection time of 46 minutes. The standard repellents dimethyl pthalate and Repellent 6–12 gave protection for only 19 and 21 minutes. Eleven mixtures of repellents each containing 6 parts of dimethyl pthalate, 2 parts of Compound I (Indalone) and 2 parts of another repellent were tested, but the mixture containing dimethyl carbate gave the best results.

Cotton shirts impregnated with 2 grammes of repellent per sq. ft. were considered to be of little value if fifteen bites were recorded on the back of the

wearer in fifteen minutes : 2-[2-(2-ethylhexyloxy)ethoxy]ethanol proved to be the most durable of twelve repellents tested in this way.

There were few mosquito landings on army uniforms freshly treated with Compound I (Indalone) but this compound was no more repellent than other treatments after a short time. Moreover, treatment of the uniforms did not deter mosquitoes from attacking the exposed heads and hands of wearers. Compound I was also the most effective of twelve repellents tested on head nets.

Dimethyl phthalate proved to be the most efficient of twelve repellents tested against sandflies, of which the predominant species was *Culicoides tristriatulus*. This substance had an average repellency time of 50 minutes. Cotton shirts treated with pyrethrum, or 2-[2-(2-ethylhexyloxy)ethoxy]ethanol did not reduce the number of landings of sandflies appreciably. *C. M. Harrison*

i. Riemschneider, R. Zur Kenntnis der Kontakt-Insektizide. I. [**Contact Insecticides.**] *Die Pharmazie.* 1948, 2. Beih., 1. Eng.–Bd., 77–172, 3 figs. [75 refs.]

——. Zur Kenntnis der Kontakt-Insektizide. II. *Ibid.* 1950, 9. Beih., 1. Eng.-Bd., 649–800, 19 figs. [339 refs.]

ii. Truhaut, R. Les dérivés organiques halogénés doués d'activité insecticide. [**Organic Halogen Derivatives with Insecticidal Properties.**] 91 pp. [91 refs.] 1948. Paris : Sedes, 99, Boulevard Saint-Michel. [4*s.* 6*d.*]

Each year a great number of papers are published concerning the discovery of new synthetic insecticides and the methods of application of slightly older ones. There is clearly a need for this work to be summarized from time to time, but the rate of progress and the delays in publication are likely to render any substantial text-book on the subject out of date by the time it appears. An alternative is to produce summarizing monographs like those referred to above.

i. The two German publications are fairly massive documents of some 30,000 to 40,000 words each. There is one section, in the first part, on the constitution and action of insecticides. [This seems to be derived from the theories of Läuger, Martin and Müller of the Geigy Company.] Apart from this section, the works seem to have been written for reference, rather than for complete reading. There are masses of data on the preparation, manufacture, chemical and physical properties, the toxicity and insecticidal action of DDT and BHC and their analogues.

In contrast to Dr. Riemschneider's monographs, which are useful for verification of all sorts of quantitative data, M. Truhaut's makes quite a readable introduction to the study of new synthetic insecticides. Most aspects of the chemical and biological theory relevant to DDT and BHC are outlined, but very few data are given and the work is useless for reference purposes.

It should be noted that in the few years since these three monographs were published, several new synthetic insecticides of promise have appeared. No mention of chlordane, heptachlor, dieldrin, aldrin, toxaphene or allethrin are given by either author in these works. *J. R. Busvine*

Mayer, K. & Strenzke, K. Versuche mit Gix zur Bekämpfung von Fliegen und Mücken. [**Experiments with Gix for the Control of Flies and Mosquitoes.**] *Anz. Schädlingsk.* Berlin. 1948, v. 21, Pt. 5, 74–6. [Summary taken from *Rev. Applied Entom.* Ser. B. 1951, May, v. 39, Pt. 5, 93–4.]

A survey is given of the results of experiments carried out in 1942–44 to test the value against mosquitos and flies of Gix (a preparation of fluoro-DDT),

used chiefly in the form of an emulsified solution. Some of the information has been noticed from a shorter report. In laboratory tests, Gix was very effective against mosquitos (*Anopheles maculipennis* Mg., *Aëdes aegypti* (L.) and *Culex pipiens* L.), *Blatta orientalis* L. and *Ctenocephalides* (*Ctenocephalus*) sp., less effective against flies (*Musca domestica* L., *Stomoxys calcitrans* (L.), *Drosophila* and *Fannia* sp.), and ineffective against *Calandra granaria* (L.). In field tests, in some of which it was used in tents, it gave good control of various Diptera, including mosquitos and *Phlebotomus*, and of some other arthropods. When mosquitos and flies crawled on a surface treated with Gix, *Anopheles* died after contact for only 10–11 seconds and flies were affected by contact for 15 seconds and died 2–11 hours later. When placed in closed containers and separated by a gauze partition from impregnated fabric, flies became fatally affected in six hours. Spraying a room with a 3 per cent. emulsion at the rate of 1 fl. oz. per 1,000 cu. ft. gave complete knockdown of Muscids and Drosophilids in an hour and complete mortality in 17 hours ; a rate of 2 fl. oz. is recommended for practical use.

The toxicity and persistence of spray deposits were reduced if the treated surface absorbed the spray and if the temperature to which the deposit was exposed was high. Thus deposits from an emulsified solution were more effective on thin sheets of cellulose than on cellulose blocks, on glass plates than on wood, and on glass plates kept for 44 hours at 8·5°C. [47·3°F.] than on those kept at 20°C. [68°F.]. The addition of milk of lime hindered the penetration of the emulsions into porous surfaces, and it also reduced vaporisation since glass plates treated with a 0·1 per cent. emulsion of Gix at the rate of about 0·33 fl. oz. per sq. ft. lost their toxic action in three months, whereas it remained unchanged when milk of lime had been added in the proportion of 1 : 6. In the case of textiles, absorptivity is of less importance, since the legs of small insects can penetrate the weave. Thus the toxic action of tent cloth treated with a 20 per cent. emulsion at the rate of about 1 fl. oz. per sq. ft. was unchanged after five months storage.

In field tests, lime washes incorporating 1, 0·5 and 0·1 per cent. emulsions of Gix and applied with a brush in animal quarters near Berlin remained effective for 7, 4 and 2 weeks, respectively, and in the Mediterranean region, a lime wash incorporating a 1 per cent. Gix emulsion similarly applied retained its toxicity for 7–10 days on stone walls and 3–4 days on wooden walls.

Comparative tests with flies and mosquitos showed that Gesarol (a DDT preparation) acts more slowly than Gix, but retains its toxicity for longer and at higher temperatures. In experiments against *Anopheles* larvae, Gesarol and Gix emulsions were both less effective than paris green, and dust mixtures were still less so.

HADAWAY, A. B. & BARLOW, F. **Sorption of Solid Insecticides by Dried Mud.** [Correspondence.] *Nature.* 1951, May 26, 854.

It has been found that the residual toxicity of particles of any one size, deposited from aqueous suspensions of insecticides, is influenced by the type of material to which they are applied. With mud blocks made from " murram ", a lateritic ironstone used for construction in Uganda, crystals of all insecticides rapidly disappeared from the surface at 25°C., crystals of DDT being visible for only a few days. The larger the particle the longer it persisted, and for any given size range, the insecticides used and arranged in order of increasing persistence were Aldrin, gamma BHC, Dieldrin and DDT. When DDT and Dieldrin crystals were no longer visible, the mud blocks lost their toxicity to mosquitoes. With gamma BHC and Aldrin the blocks were effective for a

considerable time after disappearance of the crystals. This is due to the fumigant effect from the volatile insecticide inside the block, the desorption process taking several months compared with a few hours for the sorption process.

About the whole of the dose of DDT or gamma BHC could be recovered from the interior of the block. The rate of disappearance from the surface decreased as the relative humidity increased. This may be explained by competition between water vapour and insecticidal vapour for the adsorbing surfaces. Under dry conditions, the sorbed DDT was catalytically decomposed to the ethylene derivative, the mud used having a high iron content, which suggested that the insecticide was present in the mud as a highly active surface layer.

Similar results with commercial wettable powders and oil-bound suspensions of these insecticides were obtained on Uganda mud and on Oxford, Weald and Gault clays from Britain. The difference in effectiveness of DDT and BHC wettable powders against *Anopheles gambiae* in houses with mud walls in Africa may be accounted for partly, at least, by the rapid sorption of both insecticides into the wall, resulting in one case in a complete loss of toxicity and in the other in a persistent fumigant effect. Residual effects obtained with DDT wettable powders in houses of this type may be due only to deposits on the roof. Thus variations in the persistence of insecticides on different types of material may help to explain the conflicting results reported in field trials against malaria vectors in different parts of the world. *T. E. Fletcher*

Ruiz Martínez, C. Los nuevos ectoparasiticidas en Venezuela. [**The New Insecticides in Venezuela.**] *Rev. Grancolombiana de Zootecnia, Hig. y Med. Vet.* 1950, Apr.–June, v. 4, Nos. 4, 5 & 6, 268–98, 7 figs. [91 refs.]

BOOK REVIEWS

Gradwohl, R. B. H. [M.D.], Benitez Soto, Luis [M.D.] & Felsenfeld, Oscar [M.D.] [Edited by]. **Clinical Tropical Medicine.** pp. xxiii+1647, 473 illustrations & 6 coloured pls. 1951. London: Henry Kimpton, 25, Bloomsbury Way, W.C.1. [160s.]

So many of the existing standard textbooks on tropical medicine show signs of patchy refurbishing of an originally sound but now outdated text that the advent of an entirely new work on clinical tropical medicine aroused high hopes. Much of the breath-taking advance in tropical medicine—particularly in therapeutics—has been due to the activities of our trans-Atlantic friends and we had looked for an authoritative and up-to-the-minute production from a land remote from paper shortages and printing difficulties.

The present volume is said to have been "conceived in 1944". Born in 1951, it seems to have had an unduly long period of gestation and might better have been described as an "early 1948 model". For this defect the scheme of inviting contributions from 57 workers in different parts of the world is doubtless to blame. Most of them hail from the Western Hemisphere, the majority from "South of the Rio Grande". Some of the text has been translated from the Latin tongues. British tropical medicine is represented by Dr. C. C. Chesterman, who deals with *Schistosoma haematobium* and *S. intercalatum* infections; the article on Tropical Ulcer comes from the pen of Dr. G. Panja of Calcutta.

The result is a series of finely illustrated and beautifully printed essays by men who for the most part live and work in the tropics. The paper and binding are of the high standard which we expect from American publishers, but an eight-pound book strains both wrist and pocket.

There is moreover a notable failure in synthesis and a lack of judgment in the allotment of space to different subjects. In this "clinical" textbook the clinical aspects of malaria occupy but 20 of the 1,647 pages, whereas Pinta gets 27 pages. Blackwater fever is summarily dismissed in one page, with no details of clinical aspects or of treatment. The malaria life cycle diagrams were drawn in the pre-SHORTT era. The lessons of Cairns are not referred to, the conception of causal prophylaxis is ignored and paludrine is barely mentioned.

An attempt has been made to catch up with recent advances in therapeutics by inserting a special chapter on "therapeutics of tropical diseases" in which we read that "At present the South American physician uses 2 antimalarial drugs: quinine and its salt and Atabrine"; that "the combination of quinacrine with Plasmochin has been advised as the ideal treatment, but at present it is difficult and not altogether free from danger"; and, again, "it may be necessary to administer the quinine by intravenous injection. This procedure is used only in severe and pernicious forms". But when and how and with what precautions?

A brief section on antibiotics is included but is very inadequate in view of the known range and capacity of the American products chloromycetin, aureomycin and terramycin.

In addition to the clinical chapters this book contains sections on tropical hygiene, mosquito control and on various laboratory methods, reagents, solutions and stains.

This weighty tome cannot be said to be a complete, adequate and dependable guide for the inexperienced practitioner seeking for detailed practical information on the treatment of a difficult or acute case. Nevertheless, many of the authoritative articles and the splendid photographs of conditions common in Central and South America, not well illustrated in British books, the extensive personal experience of the writers, and the copious bibliography, make it an interesting and welcome addition to our larger libraries.

George R. McRobert

MOZLEY, Alan [D.Sc., Ph.D., F.R.S.E.]. **The Snail Hosts of Bilharzia in Africa. Their Occurrence and Destruction.** pp. vii+78, 25 figs. & 2 pls. 1951. London: H. K. Lewis & Co. Ltd. [9s.]

The author of this booklet is well qualified to write on the subject of the snail hosts of bilharziasis in Africa, as he has spent considerable time in various parts of that country, investigating the habits and haunts of these creatures and the best methods of destroying them.

After a brief introduction which contains a broad outline of the disease, the life-cycle of the parasite and the vulnerable points in this life-cycle, the author expresses his outlook on the question of bilharzia control in the words, "education plus snail destruction". The subsequent emphasis and main subject matter is connected with the latter aspect.

Chapter II is devoted to descriptions of the principal snail vectors, their names (and how to pronounce them), and is addressed particularly to the complete novice in such matters. Harmless snails are also dealt with, both kinds being very well illustrated by life-size photographs. [The author's statement that the name *Physopsis africana* is a synonym of *P. globosa* and not *vice-versa* is open to question.]

The next four chapters, under various headings, deal with a classification of different kinds of water in Africa, procedure in searching for snails, likely and unlikely habitats, descriptions of actual habitats observed by the author, factors which favour abnormal increase in snail population, the habits of snails and their seasonal and local occurrence, and their vulnerability to attack, and the main principles concerned in getting rid of them. The breeding habits are described and egg-nests and young stages of the principal vectors are illustrated.

Under the heading "Dangerous Conditions", the author explains how human intervention can be responsible for abnormal increase in the number of snail vectors, and hence of the disease. Normally there is a widespread but scanty snail population in many parts of Africa, maintained precariously in the rather unfavourable African climate which tends in the rainy season to sweep them away by flooding of water-courses, and to desiccate them in the dry season. The African climate is also unfavourable to human existence; and although he can do little about the excessive rainfall, man can offset the ill effects of drought by irrigation schemes, which at the same time protect and foster the increase of snails in the dry season as well as providing them with relatively still waters during the floods. Such schemes attract more human population to the "improved" region and up goes the incidence and intensity of bilharziasis. The condition is further aggravated by the pollution of water courses by human agency and the provision of ample food material for snails. A long list is given of substances on which snails have been observed to feed, which includes such unexpected objects as dead dogs, newspapers, old boots, and beer-bottle stoppers. [In passing one cannot help being impressed by the author's insistence that filthy conditions are favourable to snails and wondering if the novice in snail collecting may not be misled by it. He would for example, as the author points out, search in vain for snails in the dirty pool illustrated in Fig. 25.]

The effects of other activities in fostering bilharziasis, engineering projects such as railways, roads, culverts and bridges, industrial development such as mining, agricultural development and the construction of bathing pools and artificial garden ponds, are next discussed, and practical hints and advice are given on how to avoid or reduce the dangerous consequences of these activities.

The final chapters deal with the various methods of direct attack on snails and on their habitats. These include drainage, filling-in, flushing, biological control, removal or promotion of vegetation, and molluscicides. The advantages and disadvantages of well-known organic and inorganic molluscicides are discussed, and special attention is given to the compounds of copper. These important agents in snail destruction are treated in some detail, their properties are described and practical guidance in their application is set down.

Inasmuch as this work is the only one of its kind ever to be published, its appearance will be welcomed. It would be improved by a more rigid adherence to the subject matter indicated by the different chapter headings, and the avoidance of repetition. For this reason one is grateful for the subject index which is appended. It will serve a useful purpose not only in advancing in a very practical way the knowledge of medical officers in Africa concerning the control of one of its worst diseases, but also by informing the lay public, many of whom are only vaguely aware of the association of bilharzia disease and snails, or even of the disease itself, and placing in their hands the knowledge which may enable them to protect themselves, their children and their staff.

The publishers are to be congratulated on the attractive set-up of the text, the quality of the paper and the xcellent photographic reproductions.

J. J. C. Buckley

SCAFFIDI, Vittorio. **Il tifo esantematico di genesi murina.** Prefazione del Prof. L. CONDORELLI. [Murine Typhus.] 216 pp., 45 figs. (3 folding). 1951. Naples: V. Idelson. [L.1500.]

This book is remarkable for the amount of fully documented information that it contains on the history, epidemiology and clinical features of flea-borne typhus. A specially valuable feature is the Bibliography which contains a list of about 500 of the more important articles on the subject. The title of each article is given in full and, especially in the case of French authors, this is often descriptive of the contents.

There is an impartial summary of the opposing views on the controversial question of the relationship between *Rickettsia mooseri* and *R. prowazeki*, and although the author inclines to the opinion that each of these organisms persistently retains its special characteristics, he rightly advises that measures of louse control should always be carried out when flea-borne typhus occurs among louse-infested persons or communities.

Brill's disease is discussed at some length, presumably because it has so often been confused with flea-borne typhus, but its inclusion in the historical description of murine typhus may create a wrong impression on the minds of readers who fail to read carefully the full and accurate description of the disease contained in the later pages of the book.

The volume deserves a place in every medical library, if only for the excellent bibliography and the illustrations, but readers who have little or no knowledge of Italian will have little difficulty in reading the text with the occasional help of a dictionary. *John W. D. Megaw*

VON HALLER, Ernst. **Gesundheitsbüchlein für die Tropen. Ratschläge für Auswanderer sowie Regeln zur hygienischen Lebensweise und zur Verhütung von Krankheiten und gesundheitlichen Schäden in den warmen Ländern.** Vorwort von E. G. NAUCK. [Handbook of Tropical Hygiene. Advice for Emigrants on how to live in the Tropics.] 92 pp., 11 figs. 1951. Stuttgart: Georg Thieme Verlag, Diemershaldenstr. 47. [DM 5.70]

This excellent little book on the preservation of health in the tropics will be of great service to the readers for whom it is intended. It has been written to meet the German demand for information about tropical diseases and conditions by non-medical travellers to, and dwellers in, the tropics, and while it is in no sense a medical text-book there are few medical practitioners who would read it entirely without profit.

It is based on von Haller's personal experience in Liberia and is packed with sound up-to-date and practical accounts of the common tropical diseases, how they are transmitted, and how best they may be guarded against.

The medical reviewer of such a book can always find matters to criticize, but such criticism is usually disarmed when one recollects that it is the non-medical reader who is being addressed throughout.

The present reviewer was disappointed not to find any mention of mosquito boots either in the general section on clothing or in the section dealing with the prophylaxis of malaria.

Vaccination against dysentery is mentioned as being on a parallel with vaccination against typhoid and paratyphoid, but surely there is no comparison either in practicability or effectiveness, the former being too painful for routine use and uncertain in its results.

Drug prophylaxis of Rhodesian trypanosomiasis is not recommended by all workers in that field because of the real danger of the development of masked infections which may imperceptibly reach the stage of incurability.

The very important matters of clean hands and clean fly-free kitchens are not forgotten, and taking the book as a whole its virtues quite eclipse its faults. *H. G. Calwell*

WIGGLESWORTH, V. B. [M.D., F.R.S.] **The Principles of Insect Physiology.** pp. viii+544, 355 figs. 4th Edition, revised. 1950. London : Methuen & Co., Ltd. & New York : E. P. Dutton & Co. Inc. [42s.]

This invaluable work was first published in 1939 and, despite the disruptions of war, required reprinting in 1944 and again in 1947. The author now presents the first revised edition in which are incorporated data and advances in the science of insect physiology new since the original edition of 1939. The book retains its original arrangement and number of chapters, but there are many insertions of new fact, some rearrangement of sections, and some entirely new sections in most of the chapters. The revision has increased the number of pages by about 100 and there are some 40 new figures ; about 1,000 new citations have been added to the references and there is now an author-index to about 1,700 names.

Some of the new matter only confirms established concepts of function ; it has been derived from experiments involving new technical methods or concerning insects not previously studied from a physiological point of view. But there are other developments of a fundamentally important nature. There have been substantial advances in the study of insect hormones and their origin in insect tissues, a subject which is admirably summarized in the chapter on the nervous system in a greatly extended section on the endocrine organs. These new findings are reflected in adjustments and interpolations in the presentation of subjects such as growth, moulting, metamorphosis, diapause and reproduction. Other subjects on which the reader will find considerable new information include the pigment products of metabolism ; sterols, folic acid and the vitamin-B complex in metabolism ; chill coma and temperature adaptation ; respiration and equilibrium in flight ; environmental factors in relation to orientation, behaviour, and survival ; the substances concerned in different biochemical processes in insect metabolism ; the structure and physiology of the insect epicuticle and of the chorion of the insect egg. There is an additional formula for the description of the effect of temperature on insects.

Studies on insects of medical importance have contributed to the new subject matter. The author's own work on *Rhodnius*, and on the reactions of *Pediculus humanus* to environmental factors are alone considerable contributions to new knowledge. A variety of physiological findings are derived from numerous new studies on *Anopheles*, *Culex*, and particularly *Aëdes aegypti*. Little that is new has been derived from *Musca*, but researches with *Calliphora*, *Lucilia* and *Sarcophaga* have been fruitful and observations on the flight and antennal sensory organs of *Muscina* introduce a fly new to physiological investigations. Other medically significant insects regarding which new information is provided include *Glossina*, *Phlebotomus*, *Simulium*, *Chironomus*, *Tabanus*, *Xenopsylla*, *Cimex*, and cockroaches.

The excellent clarity of print and illustrations of the earlier editions is maintained and the binding is again strong and durable.

Advances in insect physiology during the past decade are numerous, and comprehensive in their variety and scope ; all previous editions of this book should be replaced by this revised edition. *D. S. Bertram*

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